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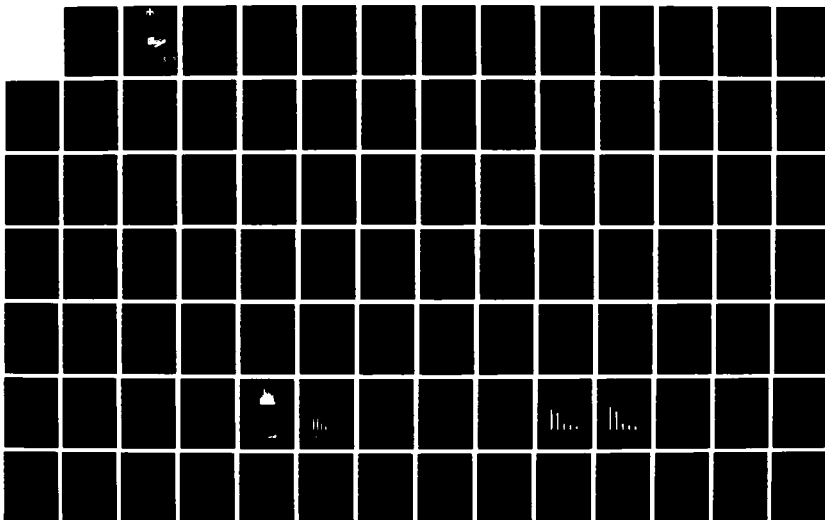
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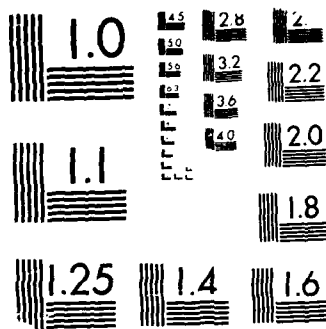
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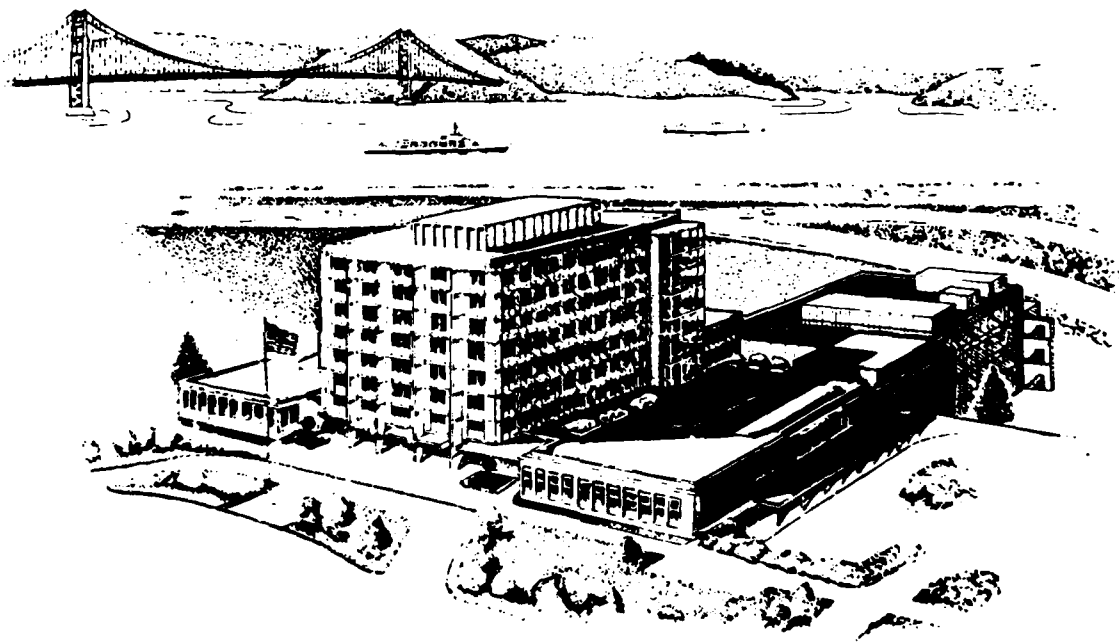
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MILITARY APPLICATIONS OF CLINICAL NEUROPSYCHOLOGY AND HEALTH PSYCHOLOGY



9-13 March 1987

Volume II

Letterman Army Medical Center
Presidio of San Francisco, California

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MILITARY APPLICATIONS OF NEUROPSYCHOLOGY
AND HEALTH PSYCHOLOGY**

**PSYCHOLOGY SERVICE
LETTERMAN ARMY MEDICAL CENTER
PRESIDIO OF SAN FRANCISCO, CALIFORNIA**

VOLUME II

9-13 March 1987

Letterman Army Medical Center
1987 AMEDD Clinical Psychology Short Course
Military Applications of Clinical
Neuropsychology and Health Psychology
9-13 March, 1987

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Smoking Risk Factors,
Military Psychology,
Privileged Communication.

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COURSE OBJECTIVES

The conference Program was designed to accomplish
The following three objectives:

1. To promote knowledge and understanding of the relationship between the brain and behavior and the evaluation of this assessment.
2. To provide basic skills training in a variety of areas of health psychology.
3. To provide a forum for continuing education, exchange of new ideas, and maintenance of high levels of professional competence for military psychologists.

VOLUME II

This volume of the Proceedings contains either the actual papers presented at the conference or representative articles submitted by the presenters.

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NEUROPSYCHOLOGY
PAPERS

Neuropsychological Screening Battery
Paper

Presented At
1987 AMEDD Clinical Psychology Short Course
San Francisco, California

Colonel Francis J. Fishburne, Ph.D.
Walter Reed Army Medical Center

Neuropsychological Screening

As the field of neuropsychology continues to expand and grow in contemporary psychology, the value of the neuropsychological evaluation has become apparent both within the field of psychology and for a large number of our medical colleagues. Not all of us are trained neuropsychologists, however, we are frequently asked to render an opinion as to the likely nature of certain behavioral presentations. In order to provide some informed opinion as to whether a patient should be referred for an in depth neuropsychological evaluation, or perhaps, an extensive psychological evaluation, most of us should have some facility with assessing basic brain behavior relationships. The typical neuropsychological evaluation may require as much as 6 or more hours of extensive examination. Not only is such an investment of time costly, but the training and background necessary to fully interpret such an extensive evaluation is within the realm of the specialist. Thus, it would be helpful if a short, comprehensive, inclusive set of assessment procedures could be developed which would assist the clinician in making the decision to further refer a patient with suspected organic involvement.

The Neuropsychological Examination.

The typical extended neuropsychological evaluation is designed to provide a comprehensive assessment of the major brain behavioral relationships. Included in such an evaluation would be assessment of sensory and motor functioning, language functioning, attention and concentration, spatial integrative functioning, memory, problem solving and intellectual abilities.

Neuropsychological Screening Battery.

In order to provide an adequate series of tests to insure that the clinical psychologist has tapped sufficient brain behavior relationships, one should include tests which would encompass the anterior and posterior functioning of both hemispheres. As closely as possible the set of neuropsychological procedures should also represent the major areas of brain behavioral functioning as outlined above. In order to provide a screening evaluation, the clinician should not be required to spend more than 1 1/2 to 2 hours in the administration of the screening procedures.

Thus, an adequate neuropsychological screening battery would consist of a set of relatively quickly administered test procedures which would encompass the brain behavioral functions typically addressed by the neuropsychologist. Obviously such a screening battery would not have the in depth examination of functions included in the neuropsychological evaluation.

Such a set of procedures has been developed at the Walter Reed Army Medical Center and is currently being utilized to quickly screen and triage many of the referrals to the Psychology Service. The following description provides information regarding the tests included in the WRAMC neuropsychological screening battery.

Motor functioning of the upper extremities is assessed using the finger oscillation examination as described by Reitan (1979). The finger tapping test is modified to present the patient with 3 trials per hand. This test consists of a simple tapping device in which the patient is required to rapidly oscillate a key up and down while a counter counts the number of oscillations accomplished in a 10 second time trial. Approximately 5 minutes are required to administer the finger oscillation test. A cutoff score of 51 taps averaged over 3 trials has been found to coincide generally with the cutoff score identified by Reitan (1979) which discriminates brain impaired from normal subjects. The normative data developed from Fromm-Auch and Yeudall (1983) provides age related norms for tapping speed.

Sensory functioning is assessed utilizing the Reitan-Klove Sensory Perceptual Exam described by Reitan (1979). This test presents the patient with unilateral and double bilateral, simultaneous, confrontation stimulation in the tactile, auditory and visual modalities. In addition, the Finger Tip Number Writing test is administered. The Tactile Finger Localization test and Tactile Form Recognition test components of the sensory evaluation are excluded. The sensory evaluation can be completed in 10 minutes. Norms for discriminating impaired from normal levels of functioning on the sensory examination can be found both in the work of Reitan (1979) and Fromm-Auch and Yeudall (1983). In general, the normal individual should not be expected to have any difficulty identifying unilateral or simultaneous, bilateral confrontation stimulation. However, it is not unusual for the normal subject to show 2-3 errors on either hand on finger tip number writing.

Attention and Concentration is assessed utilizing the Digit Span subtest from the Wechsler Adult Intelligence Scale Revised (Wechsler, 1981) and the Trails A component of the Trails Test (Reitan, 1979). The Digit Span subtest requires approximately 5 minutes to administer. A general criteria for performance of the Digit Span subtest is that the normal individual should be able to repeat 5 digits forward and 3 digits backward. Certainly, the digit span scale score should be consistent with the subject's history with respect to educational or occupational achievement. The Trails A test can best provide information on attention and concentration with respect to either a slow performance, above the cutoff score of 30 seconds, or a performance in which the subject makes errors in sequence.

Visual Motor functioning is assessed utilizing the Block Design subtest of the Wechsler Adult Intelligence Scale Revised (Wechsler, 1981). This is a sensitive test for pattern recognition and integration within the visual and motor cortex. This test takes approximately 10 minutes to administer. As is the case with Digit Span, the Block Design scale score should be consistent with expectation given the subject's prior educational or occupational history. A characteristic of right hemisphere impaired subjects is that they will break the square configuration of the pattern, e.g. place three or more blocks in a row or column in a 2 by 2 design or four or more blocks in a row or column in a 3 by 3 design.

Visual Constructive abilities are assessed with the drawing components of the Reitan-Indiana Aphasia Screening Exam (Reitan, 1979) which assesses the patients ability to reproduce simple geometric designs. In addition, the patient is asked to draw the face of a clock, put the numbers in, and set the time at 10 after 11. These procedures require approximately 5 minutes. In evaluating the patient's reproduction of simple geometric figures, the clinician should be attuned to the general symmetry of the figure. Patients with visuo-constructive difficulties have particular difficulty with the Greek cross. The clock should be examined to insure that the numbers have been accurately placed in sequence, that the hands are properly positioned, and that the center of the clock is correctly identified. Frontal lobe patients show difficulty with the spatial relationship of the 10 and 11, often placing the 10 after the 11 or drawing the hands such that they point to the 10 and 11.

Receptive Language functioning is evaluated with the Token Test (Di Renzi & Vignola, 1962; Kimura, 1979). The Token Test utilizes a series of 20 tokens which are comprised of 2 sizes, large and small, 5 colors, red, white, green, yellow and black, and 2 shapes, circles, and squares. The Token Test requires approximately 10 minutes to administer. A reasonable cutoff score for identifying patients with receptive language deficits is a score below 32 on the Token Test. At the present time the component score on the Token Test is utilized for research purposes only. A copy of the Token Test form is in the appendix.

Expressive Language functioning is assessed with the interview and Controlled Oral Word Association Test (Lezak, 1983). The Controlled Oral Word Association Test is a simple test in which the patient is required to name as many words as he can in a 1 minute time frame utilizing a specific letter. The patient is first given a practice trial with the letter S and then three one minute trials with the letters C, F, and L. The interview and Controlled Oral Word Association Test require approximately 30 minutes. Normative data for the Controlled Oral Word Association Test can be found in Lezak (1983).

Problem Solving is assessed using the Trails Test, Parts A and B, (Reitan, 1979). Part A of the Trails Test requires the patient to connect a series of circles in order. The circles are randomly distributed over an 8 1/2 by 11 inch page of paper and have numbers in them. Part B of the Trails Test is similar except the circles have numbers and letters in them and the patient is required to connect the circles alternating from a number to a letter, then a number and then a letter. The Trails Test requires approximately 10 minutes to administer. Reitan's (1979) criteria for normal functioning on the Trails Test is 30 seconds or less for Trails A and 89 seconds or less for Trails B. Lezak (1983) reports age norm information for the Trails Test. A copy of the Trails Test is in the Appendix.

Memory is assessed in the auditory verbal and visuo-spatial modalities utilizing the Wechsler Memory Scale-Russell Adaptation (Russell, 1975). In this version of the WMS the patient is administered the logical paragraphs and is required to copy the figural designs. One half hour after the patient has completed the first administration of the WMS he is asked to recall as much data as he can from the paragraph stories which were read to him and to once again reproduce the designs which he saw on the first administration. The WMS requires

approximately 20 minutes to administer. Normative data for the performance on the WMS as modified by Russell is reported in his 1975 article.

Methods of Interpreting Neuropsychological Data.

The neuropsychologist uses four modes of clinical interpretation when evaluating data from the neuropsychological examination. These modes of clinical inference have been applied extensively to the assessment of brain behavior relationships and are described by Rourke (1981).

Level of Performance is essentially the manner of interpretation which most psychologists use when reviewing psychological test data. Here the psychologist simply determines if a particular test score on quantifiable tests falls within the normal or abnormal range that has been specified in controlled studies of the concurrent validity of the test. The best example of this type of inference is that used with the WAIS where an individual with a WAIS full scale IQ is considered to function at the 50th percentile of the general population with respect to intellectual functioning.

Comparison of performance on the two sides of the body is utilized in neuropsychological assessment to provide the clinician with information regarding the relative effectiveness of the two sides of the body. The most revealing and easiest to identify patterns of performance of the two sides of the body are those involving the motor and sensory systems. In normal development, the individual's sensory systems are considered to develop equally. Thus, discrepancies identified on one side of the body suggest contralateral involvement of the opposite cerebral hemisphere. An individual who evidences reduced efficiency of recognition of confrontation stimulation in the tactile, auditory, or visual modalities on one side of the body may have some neuropathology existing in the contralateral hemisphere. Although motor performance is also generally equally developed, there is a slight differential noted between the dominant and nondominant upper extremities. The general rule of thumb is that the dominant upper extremity should be approximately 10% more efficient than the nondominant upper extremity. Naturally, this relationship does not hold with the ambidextrous individual. In addition to the two sides of the body, one may be able to derive an accurate inference from the relative performance of the subject's verbal versus visual-motor memory on the

Wechsler Memory Scale. Where attention and concentration deficits may be ruled out, poor performance on verbal memory with normal performance on visual memory may suggest impairment in the dominant hemisphere whereas poor performance on visual memory with normal performance on verbal memory may suggest impairment in the nondominant hemisphere.

Pathognomonic signs is an approach typically utilized by the physician in evaluating symptoms which represent disease complexes. Neuropsychologists have adapted this method of inference to assist in the full evaluation of neuropsychological data. Typically encountered pathognomonic signs include specific forms of language disturbances such as difficulty naming, slurring of speech, problems with understanding spoken or written language, and difficulties expressing oneself verbally. Also, when one reviews a patient's drawings there is often the pathognomonic sign of the neglect of one side of space, e.g. a Greek cross drawn with either the left or right side omitted.

Pattern analysis is the 4th method of inference utilized in evaluating neuropsychological test data. Here, the neuropsychologist looks for typical patterns which are consistent with decrement of performance in specific brain areas. Thus, an individual who shows poor visuo-integrative skills with relatively normal language skills may be reflecting a pattern suggesting posterior right parietal impairment. The individual who has poor spoken language ability indicating an aphasia with relatively intact right hemisphere functions is presenting with a pattern suggesting impairment within the anterior left hemisphere.

Laying Out Case Data.

After the neuropsychological screening data has been collected and recorded, the next step in the interpretative process is to lay out the case data. Examples of case data layout can be found with the three sample cases included in this article. At the top of the page you find three headings left hemisphere, nonlateralizing and right hemisphere. This method of laying out the data provides the clinician with a visual picture of the patient's performance. Under the column headed left hemisphere would be included elements of the patient's performance which suggest or implicate left hemisphere dysfunction. Items which would be included here from the neuropsychological screening battery include motor, sensory, and language deficits. Motor and tactile

sensory functioning on one side of the body is controlled by the motor and somatosensory strips in the contralateral (opposite) hemisphere. To a lesser extent this relationship is true for auditory and visual organization. If the performance of the right hand on the tapping test in a right handed patient is less than 10% better than the performance with the left hand there is a suggestion that the right hand is functioning more slowly than expected. Thus, the motor performance of the right hand would be listed under the left hemisphere column. When there are suppressions of sensory functioning on the right side of the body in the absence of suppressions on the left side of the body, these suppressions would be listed under the left hemisphere column. In the event that suppressions are noted bilaterally, such suppressions would only be lateralized if the preponderance of suppressions on one side was greater than the opposite side plus 2. The same rule applies in lateralizing errors on the Fingertip Number Writing Test. Motor and sensory dysfunction on the left side of the body would be listed under the right hemisphere column following the same general rules as identified for the left hemisphere column. However, the motor functioning of the left hand would have to be more than 10% less than the performance with the right hand.

Attention and concentration deficits do not lateralize. Therefore, performance on the Digit Span would be included under the center column. Block design if performed poorly and the gestalt of the block pattern has been violated suggests a right hemisphere problem and would be lateralized to the right under these conditions. Difficulty in copying the figures of the aphasia screening examination indicates constructional dyspraxia and would lateralize to the right hemisphere column. Deficits on the Token Test suggesting impairment of receptive language functioning would lateralize under the left hemisphere column. Any evidence of expressive language dysfunction would also lateralize under the left hemisphere column. The Trails Test does not lateralize and would be listed in the center under the nonlateralizing column. Although memory may lateralize depending on the relative performance of verbal versus figural memory, I typically place the memory score at the bottom of the page across the page without lateralizing that particular element. The rationale for not lateralizing is that other factors than verbal or spatial dysfunction may cause the memory deficit. After the data has been laid out in this fashion it is easy to determine if a lateralizing condition exists.

Case examples.

Three cases are included for demonstration purposes. Here the reader will find examples of patients who have been referred for neuropsychological evaluation and administered either the complete or part of the screening battery. These examples will demonstrate the usefulness of the screening battery and show how the clinician can interpret the information from the screening battery.

JB Age 31 Right Handed Caucasian Male

History: JB reported a normal developmental history. He attended summer school in the third and fourth grades. He was never held back a grade nor did he attend any special classes. He is a high school graduate and reports that he was an average student. He works in a low level white collar job as an administrative supervisor. He has been employed with the same firm for the past 11 years. He intends to remain with this firm until he retires. He has made reasonable progression within the firm for someone who functions at his level. He reports no remarkable medical history. He states that he has no problems with his vision, hearing, or sense of touch. Mental status was clear. He was cooperative for the evaluation.

JB Screening Test Results:

Motor Performance: Right-55 taps/10 sec Left-49 taps/10 sec

Sensory: Tactile - Right - 0 errors Left - 0 errors

Auditory - Right - 0 errors Left - 0 errors

Visual - Right - 0 errors Left - 0 errors

FT#W - Right - 3 errors Left - 2 errors

Attention/Concentration: Digit Span - 12 scaled score

Optic-Motor: Block Design - 12 scaled score

Construction: Normal

Token Test: Not Administered

Simple Problem Solving: Trails A - 30" 0 errors

Trails B - 54" 0 errors

Memory:

Semantic

Figural

Recall 29 (0)

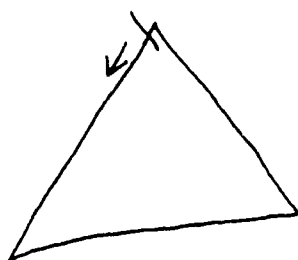
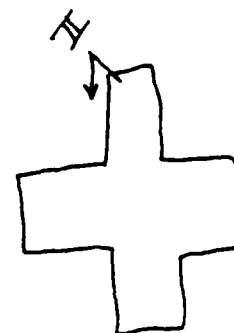
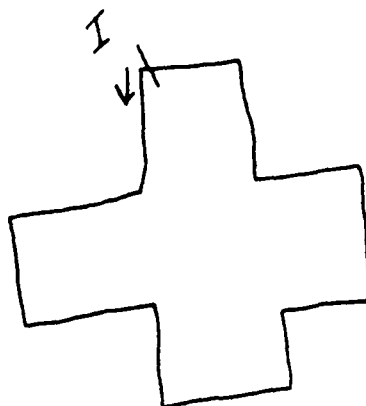
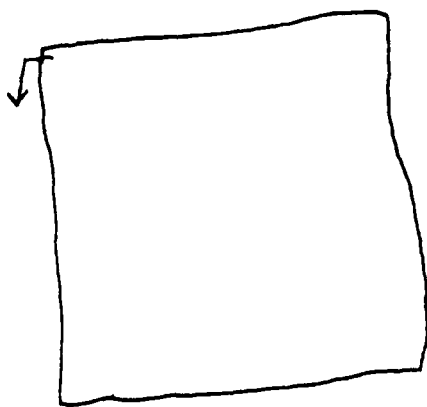
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1/2 Hr Delay 26 (0)

9 (1)

% Retained 90 (1)

82 (2)



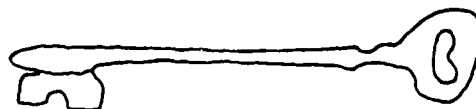
clock square

he shouted the warning

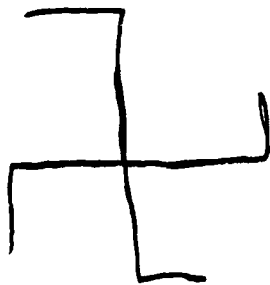
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58

51

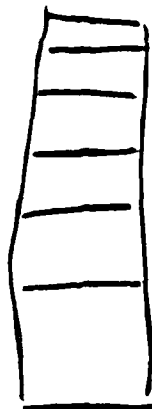


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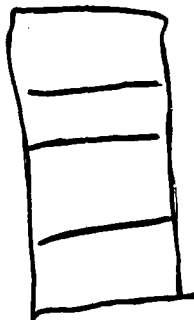


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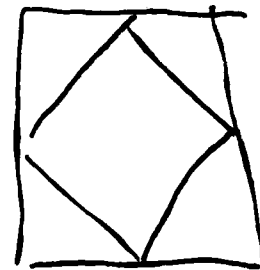
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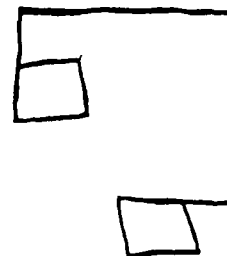
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VI. 3-L; 3-R



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Fold Part VII under on broken line before giving paper to subject for drawing in Part VI.

VI. VISUAL REPRODUCTION 1 2 2 5 3-L 2 3-R 2 Total 11

VII. ASSOCIATE LEARNING

First Presentation

Come - Go
Lead - Pencil
In - Although
Country - France
Dig - Guilty
Lock - Door
Jury - Eagle
Murder - Crime
Knife - Sharp
Necktie - Cracker

Second Presentation

Knife - Sharp
Jury - Eagle
Country - France
Lead - Pencil
Necktie - Cracker
Murder - Crime
Lock - Door
Come - Go
Dig - Guilty
In - Although

Third Presentation

Country - France
Necktie - Cracker
Murder - Crime
Dig - Guilty
Come - Go
In - Although
Lock - Door
Jury - Eagle
Lead - Pencil
Knife - Sharp

First Recall Easy Hard

Knife _____
Lead _____
Jury _____
Country _____
In _____
Murder _____
Necktie _____
Lock _____
Come _____
Dig _____

TOTAL

Second Recall Easy Hard

Lock _____
Dig _____
Come _____
Jury _____
Knife _____
Country _____
In _____
Murder _____
Necktie _____
Lead _____

TOTAL

Third Recall Easy Hard

Lead _____
Lock _____
Necktie _____
Come _____
Dig _____
Country _____
Jury _____
Knife _____
In _____
Murder _____

TOTAL

Easy 1) _____

2) _____

3) _____

(A) Total _____

A : 2 _____

Hard 1) _____

2) _____

3) _____

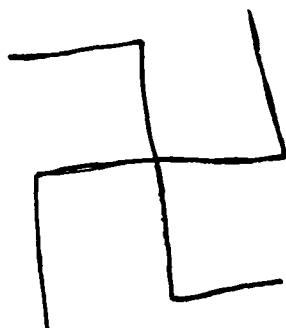
(B) Total _____

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$$\frac{A}{2} + B =$$

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VI. 1

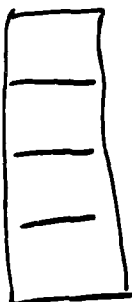


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VI. 2

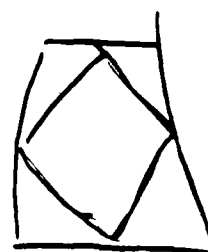


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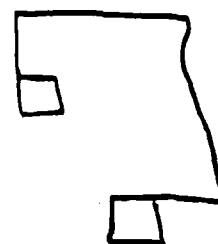


VI. 3-L; 3-R

J B #2



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Fold Part VII under on broken line before giving paper to subject for drawing in Part VI.

VI. VISUAL REPRODUCTION

1 2 2 3 3-L 2 3-R 2 Total 9

VII. ASSOCIATE LEARNING

First Presentation

Come - Go
Lead - Pencil
In - Although
Country - France
Dig - Guilty
Lock - Door
Jury - Eagle
Murder - Crime
Knife - Sharp
Necktie - Cracker

Second Presentation

Knife - Sharp
Jury - Eagle
Country - France
Lead - Pencil
Necktie - Cracker
Murder - Crime
Lock - Door
Come - Go
Dig - Guilty
In - Although

Third Presentation

Country - France
Necktie - Cracker
Murder - Crime
Dig - Guilty
Come - Go
In - Although
Lock - Door
Jury - Eagle
Lead - Pencil
Knife - Sharp

First Recall

Knife _____
Lead _____
Jury _____
Country _____
In _____
Murder _____
Necktie _____
Lock _____
Come _____
Dig _____

TOTAL _____

Second Recall

Lock _____
Dig _____
Come _____
Jury _____
Knife _____
Country _____
In _____
Murder _____
Necktie _____
Lead _____

TOTAL _____

Third Recall

Lead _____
Lock _____
Necktie _____
Come _____
Dig _____
Country _____
Jury _____
Knife _____
In _____
Murder _____

TOTAL _____

Easy 1) _____

2) _____

3) _____

(A) Total _____

A ÷ 2 _____

Hard 1) _____

2) _____

3) _____

(B) Total _____

SCORE

$$\frac{A}{2} + B =$$

JB 31 year old white male 12 years education
Army Enlisted (E-6)

Right-Handed

Left Hemisphere

Non Lateralizing

Right Hemisphere

Tapping R - 55
L - 49
Tactile ROX LOX
Auditory ROX LOX
Visual ROX LOX
FT#W R-3X L2X
Digit Span 12
Block Design 12
Trails A - 30" OX
Trails B - 54" OX
Constructions - Normal

WMS Semantic R29(0), 1/2H26(0); % 90(1); Figural R11(1);
1/2H9(1); %82(2)

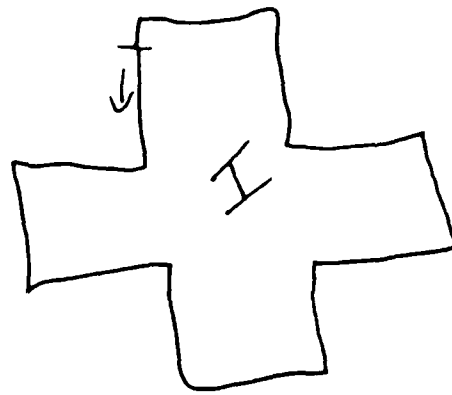
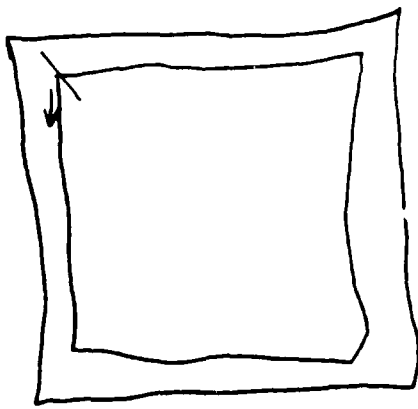
Analysis. JB is a normal subject who volunteered to take the neuropsychological evaluation. His motor performance with the dominant, right, hand was 55 taps per ten second trial on average over three trials. This performance is above the cut off score of 51 and represents a normal level of performance. Based upon his good right hand tapping performance, one would expect JB to tap approximately ten percent slower with the left hand or at a rate of 49.5 taps per ten second trial. His actual performance of 49 taps per ten second trial is within the expected level and demonstrates balanced motor tapping speed. Thus, JB's motor speed is within normal limits and balanced with respect to the two sides of the body. Motor functioning does not lateralize and is placed under the nonlateralizing column. JB made no errors in discriminating unilateral and no suppressions of bilateral, simultaneous confrontation stimulation in the sensory modalities. Tactile, auditory and visual results are placed under the non-lateralizing column because the criteria for lateralizing is not met. JB made three right sided and two left sided errors in identifying numbers written on the fingertips. This performance does not meet the criteria for lateralizing and is placed under the middle column. Using the Fromm-Auch and Yeudall (1983) norms, this places JB approximately one standard deviation below the mean for his age group on FT#W performance on either hand. Attention and concentration as measured with the Digit Span subtest of the WAIS-R reflects an above average level of performance, scale score of 12, which is

at least consistent with JB's educational and occupational history. Trails A performance of 30 seconds with no errors is mildly slow and just within the impaired range. Both Digit Span and Trails A are placed under the non-lateralizing column because they do not lateralize when using these performances as measures of attention and concentration. JB's Block Design subtest scaled score of 12 is also at or above expectation given his educational and occupational history. Since this is a more than adequate performance, it does not provide lateralizing information and is placed under the center column. Examination of JB's drawings reflects generally adequate design. The second cross, always have the subject draw two crosses, appears a little misshapen, but it is not excessively distorted. Substantive evidence for constructional problems is not present in these drawings, therefore, a notation of constructions-normal is placed under the center column. JB was evaluated prior to the use of the clock drawing and the token test and information on these tasks is not available for JB. Simple problem solving as determined with Trails A and B shows JB to be slow in processing information in the solution of Trails A, however, his performance on Trails B is normal. He is able to maintain two ideas in mind simultaneously and shift from one to the other demonstrating normal mental flexibility at this level. The Trails Test does not lateralize and is always found under the center column. JB's recall for simple paragraph length stories was excellent as was his memory for the stories one-half hour after the stories were read to him. A zero scaled score for recall and delayed memory indicates above average performance. JB's recall and delayed memory for the designs of the WMS form II was at average levels. The normal individual is expected to retain approximately 86 percent or better of information initially recalled. Therefore, based on the amount of figural information recalled, JB's delayed memory for figural information is below expectation, a 2 scaled score. Since both verbal and visual memory are normal and the difference in performance between these modalities is not striking no lateralizing information is gained. The layout of the data indicates that JB's performance does not lateralize either to the left or right hemisphere. Therefore, there is no indication of a relative deficiency of the left or right hemisphere. Review of nonlateralizing data indicate that JB is performing within normal limits on most elements of the neuropsychological screening battery. Thus, there is no indication that further assessment or referral is necessary in this case. It is not unusual for a normally

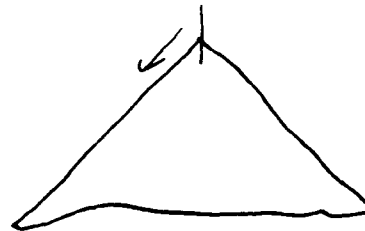
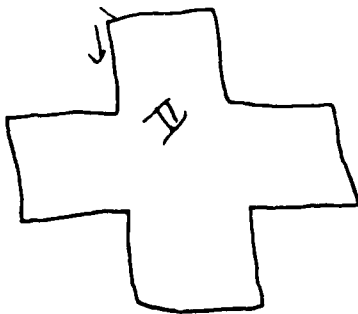
functioning brain to show mild or even moderate inefficiencies in some areas of functioning. What is lacking in this case is clear evidence of a pattern or significant pathognomonic signs of abnormal brain behavioral relationships.

RK Age 42 Right Handed Caucasian Male

History: RK reported normal developmental history. He is a college graduate having obtained a B.S. degree in engineering from the University of Wisconsin and an M.S. degree in management. He is presently employed as a construction engineer and has worked for the same firm for the past 18 years. He has had a normal progression within the firm. He is a smoker for 20 years, and reports smoking approximately one pack per day. He reports that he is a social drinker and has been averaging approximately 4 ounces per day for the last 6 to 10 years. He has never had any hospitalizations for alcohol abuse. He denies any drug abuse. He is married and has two children, a son eight and a daughter five. He indicates that his marriage is stable. He reported that there was an indication of high blood pressure on a physical which he took 6 years ago, however, this was not treated. He has had three surgeries: tonsilectomy at age 6, in 1958 his left thumb was cut off, and in 1961 he had hand surgery. He reports no complications from his surgeries. He reports no incidence of head trauma or loss of consciousness. He has had no unusual medical illnesses. He reports that his hearing is deteriorating, especially the upper frequencies, that he has noted occasional blurring of his vision with spots at the extreme periphery, and that he has some numbness in the right hand. According to the referring physician he began having problems a year ago, which consisted of uneasiness and vertigo with pressure sensation in the ears. He also had numbness in the right hand and foot and headaches. These episodes increased over the past several months and have occasionally been associated with mental confusion. He had no motor manifestations except some clumsiness of the right side which could be overcome with concentration.



R K
11 April 79



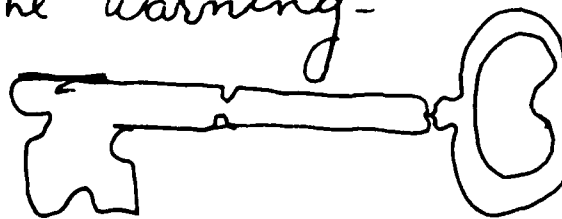
clock

Square

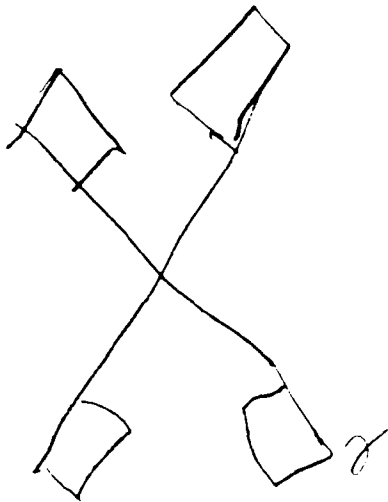
Each shouted the warning-

$$\begin{array}{r} 85 \\ 27 \\ \hline 58 \end{array}$$

51

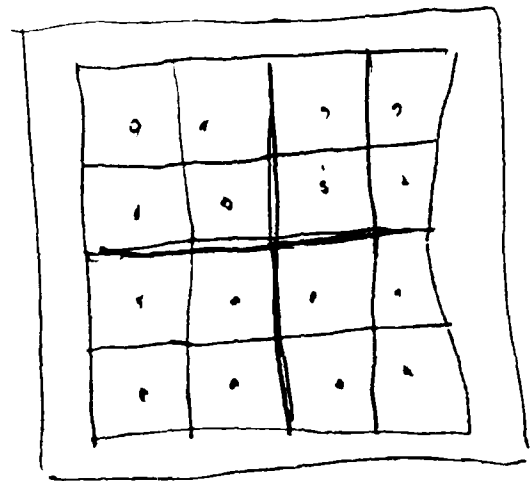


VI-A



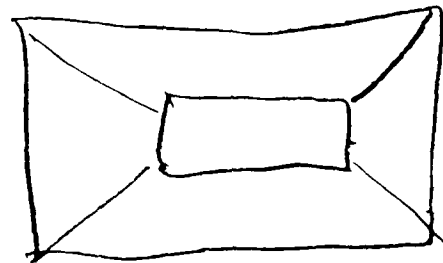
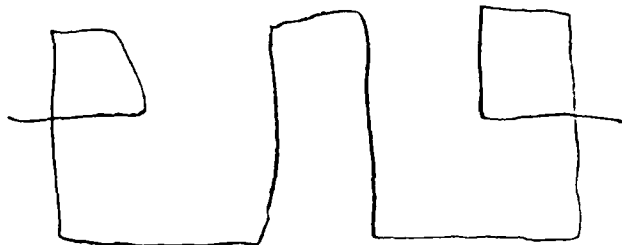
VI-B

RK #1



4

VI C-1. C-2



Fold Part VII under on broken line before giving paper to subject for drawing in Part VI.

VI VISUAL REPRODUCTION A 2 B 1 C-1 1 C-2 1 Total 11

VII. ASSOCIATE
LEARNING

First Presentation

Metal - Iron
Baby - Cries
Crush - Dark
North - South
School - Grocery
Rose - Flower
Up - Down
Obey - Inch
Fruit - Apple
Cabbage - Pen

Second Presentation

Rose - Flower
Obey - Inch
North - South
Cabbage - Pen
Up - Down
Fruit - Apple
School - Grocery
Metal - Iron
Crush - Dark
Baby - Cries

Third Presentation

Baby - Cries
Obey - Inch
North - South
School - Grocery
Rose - Flower
Cabbage - Pen
Up - Down
Fruit - Apple
Crush - Dark
Metal - Iron

First Recall Easy Hard

North _____
Fruit _____
Obey _____
Rose _____
Baby _____
Up _____
Cabbage _____
Metal _____
School _____
Crush _____

Second Recall Easy Hard

Cabbage _____
Baby _____
Metal _____
School _____
Up _____
Rose _____
Obey _____
Fruit _____
Crush _____
North _____

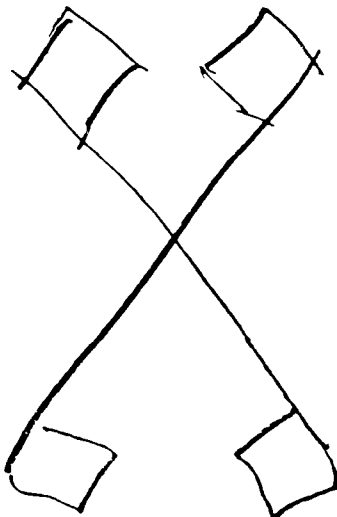
20

Third Recall Easy Hard

Obey _____
Fruit _____
Baby _____
Metal _____
Crush _____
School _____
Rose _____
North _____
Cabbage _____

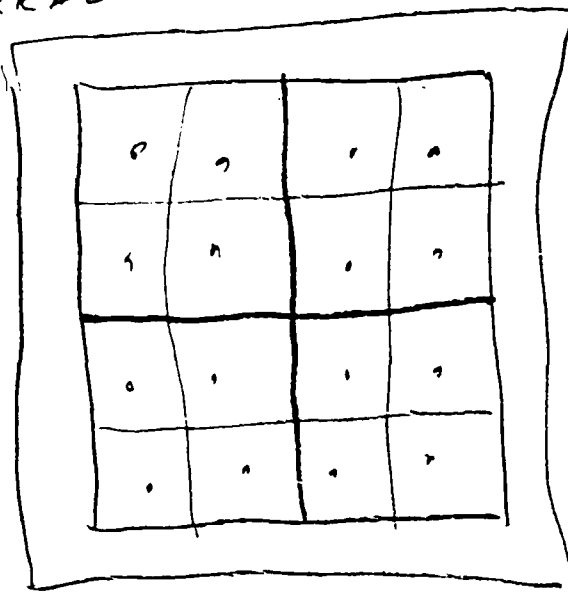
Easy 11
Hard 20
(All Total) 31
A = 2
Hard 11
20
(B) Total 31
SCORE
A

VI-A

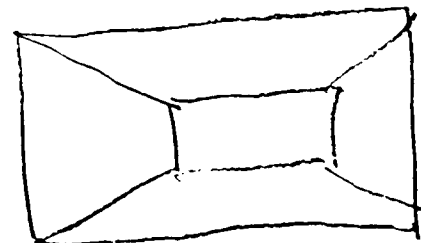


VI-B

RKFL



VI C-1. C-2



Fold Part VII under on broken line before giving paper to subject for drawing in Part VI.

VI. VISUAL REPRODUCTION A 2 B 1 C-1 3 C-2 2 Total 11

VII. ASSOCIATE
LEARNING

First Presentation

Metal - Iron
Baby - Cries
Crush - Dark
North - South
School - Grocery
Rose - Flower
Up - Down
Obey - Inch
Fruit - Apple
Cabbage - Pen

Second Presentation

Rose - Flower
Obey - Inch
North - South
Cabbage - Pen
Up - Down
Fruit - Apple
School - Grocery
Metal - Iron
Crush - Dark
Baby - Cries

Third Presentation

Baby - Cries
Obey - Inch
North - South
School - Grocery
Rose - Flower
Cabbage - Pen
Up - Down
Fruit - Apple
Crush - Dark
Metal - Iron

First Recall Easy Hard

North _____
Fruit _____
Obey _____
Rose _____
Baby _____
Up _____
Cabbage _____
Metal _____
School _____
Crush _____
TOTAL _____

Second Recall Easy Hard

Cabbage _____
Baby _____
Metal _____
School _____
Up _____
Rose 21 _____
Obey _____
Fruit _____
Crush _____
North _____
TOTAL _____

Third Recall Easy Hard

Obey _____
Fruit _____
Baby _____
Metal _____
Crush _____
School _____
Rose _____
North _____
Cabbage _____
Up _____
TOTAL _____

Easy 1) _____

2) _____

3) _____

(A) Total _____

A - 2 _____

Hard 1) _____

2) _____

3) _____

(B) Total _____

SCORE

A

B

RK Screening Test Result:

Motor Performance: Right-44 taps/10 sec Left-56 taps/10 sec
Sensory: Tactile - Right - 1 errors Left - 0 errors
Auditory - Right - 1 errors Left - 0 errors
Visual - Right - 1 errors Left - 2 errors
FT#W - Right - 4 errors Left - 0 errors
Attention/Concentration: Digit Span - 6 scaled score
Optic/Motor: Block Design - 11 scaled score
Construction: Normal
Token Test: Not Administered
Simple Problem Solving: Trails A - 32" 1 error
Trails B - 227" 1 error

Memory:	Semantic	Figural
Recall	16 (3)	11 (1)
1/2 hr Delay	16 (2)	11 (0)
% Retained	100 (0)	100 (0)

RK 42 year old white male 18 years education
Army Officer (Lieutenant Colonel)

Right Handed

<u>Left Hemisphere</u>	<u>Non-Lateralizing</u>	<u>Right Hemisphere</u>
Tapping R - 44	Visual R1X L2X	
L - 56	Digit Span 6	
Tactile R1X LOX	Block Design 11	
Auditory R1X LOX	Construction Normal	
FT#W R4X LOX	Trails A - 32" 1X	
	B - 227" 1X	

WMS: Semantic R16(3); 1/2H16(2), %100(0), Figural R11(1),
1/2H11(0), %100(0).

Analysis RK is a gentleman who was evaluated prior to neurosurgery for removal of a left anterior parietal astrocytoma. RK's motor performance with the dominant hand is below the expected cutoff level of 51. In comparison to his performance with the left hand, which is excellent, his performance with his right, dominant, hand suggests a relative inefficiency of the right hand when comparing the two sides of the body. Thus, the tapping scores are placed under the left hemisphere column. RK makes one suppression on the right side to tactile and auditory simultaneous, bilateral confrontation stimulation. In contrast, he made no errors on tactile or

RK Screening Test Result:

Motor Performance: Right-44 taps/10 sec Left-56 taps/10 sec
Sensory: Tactile - Right - 1 errors Left - 0 errors
Auditory - Right - 1 errors Left - 0 errors
Visual - Right - 1 errors Left - 2 errors
FT#W - Right - 4 errors Left - 0 errors
Attention/Concentration: Digit Span - 6 scaled score
Optic/Motor: Block Design - 11 scaled score
Construction: Normal
Token Test: Not Administered
Simple Problem Solving: Trails A - 32" 1 error
Trails B - 227" 1 error

Memory:	Semantic	Figural
Recall	16 (3)	11 (1)
1/2 hr Delay	16 (2)	11 (0)
% Retained	100 (0)	100 (0)

RK 42 year old white male 18 years education
Army Officer (Lieutenant Colonel) Right Handed

<u>Left Hemisphere</u>	<u>Non-Lateralizing</u>	<u>Right Hemisphere</u>
Tapping R - 44	Visual R1X L2X	
L - 56	Digit Span 6	
Tactile R1X LOX	Block Design 11	
Auditory R1X LOX	Construction Normal	
FT#W R4X LOX	Trails A - 32" 1X	
	B - 227" 1X	

WMS: Semantic R16(3); 1/2H16(2), %100(0), Figural R11(1),
1/2H11(0), %100(0).

Analysis RK is a gentleman who was evaluated prior to neurosurgery for removal of a left anterior parietal astrocytoma. RK's motor performance with the dominant hand is below the expected cutoff level of 51. In comparison to his performance with the left hand, which is excellent, his performance with his right, dominant, hand suggests a relative inefficiency of the right hand when comparing the two sides of the body. Thus, the tapping scores are placed under the left hemisphere column. RK makes one suppression on the right side to tactile and auditory simultaneous, bilateral confrontation stimulation. In contrast, he made no errors on tactile or

auditory discrimination on the left side. Therefore, the preponderance of errors is on the right side and should be placed under the left hemisphere column for tactile and auditory imperceptions. RK had one right sided and two left sided visual suppressions. Since neither right or left is greater by 2, visual sensory results are placed under the center column. RK's performance on the Fingertip Number Writing Test showed 4 errors on the right hand and no errors on the left hand. This performance weights to the left hemisphere and is placed under that column. Attention and concentration as measured by Digit Span suggest that RK's attention and concentration is lower than expected given his educational and occupational history. Someone with 18 years of education is expected to have an above average Digit Span scale score. Results of the Trails A test show that RK is slow in performing this task and made one error in connecting the numerical sequence of the circles. Thus, there is evidence of mild attention and concentration difficulties and these results are placed under the center or nonlateralizing column. Examination of the figures which RK produced shows relatively adequate quality in the cross, square, and triangle. Construction normal is therefore located under the center, nonlateralizing column. RK's performance on the Trails B test falls well within the impaired range suggesting that he is having difficulty with mental flexibility. RK's recall for verbal, paragraph length stories is mildly impaired at a scale score of 3. However, his retention for the stories after one half hour is excellent. RK's performance on the figural drawing portion of the WMS is at expected levels and within normal limits of functioning. The layout of the data show evidence suggesting problems in the left hemisphere. The subject's tapping speed with the right hand is significantly slower than with the left hand. RK also has suppressions in the tactile and auditory sensory modalities. There is also a preponderance of errors of fingertip number writing on the right hand. Digit Span is below expectation for this individual. Verbal recall is also lower than expected for an individual with 18 years of education. Thus, the data suggest that something may be wrong in the patient's left hemisphere. A referral to a neuropsychologist and neurologist for more extensive evaluation is warranted.

CS Age 45 Right Handed Caucasian Male

History: CS reports normal developmental history. His early childhood history is significant for double

pneumonia as an infant substantial asthma problems, and a bus accident in which he struck his head. He remembers no details of the bus accident but does not believe he was seriously injured. CS's educational history reflects attendance at multiple elementary schools. He reports that he was mostly a "C" student in elementary school largely as a result of his medical problems with asthma. In college at Texas Tech University where he obtained his B.S. and M.S. degrees, he was a good student and was in the upper 10 percent of his undergraduate class. He is a planning analyst with the nuclear industry and holds a civil service rating of GS-12. He was previously in a GS-14 position but had to take a reduction in grade because the organization in which he worked was being dismantled. CS is a non-smoker, and he never drank very much; he reports that his last drink was maybe a decade ago. He denies any drug usage. He is married and has two children. He reports that his marriage is stable. He has had surgery for a tonsilectomy and disc repair. He reports that he has lost sensation in his fingers, particularly the left hand, since the disc surgery. He states that his hearing has decreased some but an audiological exam three years ago showed his hearing to be reasonably good. He states that he has had some trouble with his vision to include episodic double vision. CS reports that his present problem began in 1976. At that time he saw a specialist in Texas who specialized in nutrition whom he states recognized CS's need for sunlight. CS believes that he is suffering from a Vitamin D deficiency related to working in office areas where direct exposure to sunlight has not been available to him. He reports that his job performance has deteriorated significantly over the past few years. His present medications include calcium tablets and other nutritional medications. He was referred by his psychiatrist to rule out organic brain disease. CS was generally slow in thought and actions. He was perseverative on the topic of sunlight and natural spectrum light. He brought a notebook full of articles related to this area for the examiner to review. He had a broad-based gait and evidenced some instability in movement through the office and hallways. He had occasional twitches of his head during the course of the evaluation. His thinking was clear, he was well oriented, and task directed. CS was cooperative throughout the evaluation.

CS Screening Test Results:

Motor Performance: Right-45 taps/10 sec Left-33 taps/10 sec
Sensory: Tactile - Right - 2 errors Left - 4 errors
Auditory - Disc/Results Unreliable
Visual - Disc/Results Unreliable
FT#W - Right - 12 errors Left - 12 errors
Attention/Concentration: Digit Span - 8 scaled score
Optic-Motor: Block Design - 7 scaled score
Construction: Abnormal
Token Test: 114 of 116, 34.5 of 36
Simple Problem Solving: Trails A - 39" 0 errors
Trails B - 211" 2 errors

Memory:	Semantic	Figural
Recall	16 (3)	4 (4)
1/2 Hr Delay	11 (3)	3 (4)
% Retained	69 (2)	75 (2)

CS 45 year old white male 18 years education
Civil Servant GS-12

Right Handed

Left Hemisphere

Non-Lateralizing

Right Hemisphere

Spelling
dyspraxia
(Warring)

Tactile - R2X L4X
FT#W - R12X L12X
Auditory - unreliable
Visual - unreliable
Digit Span - 8
Token Test 114/116; 34.5/36

Tapping R - 45
L - 33

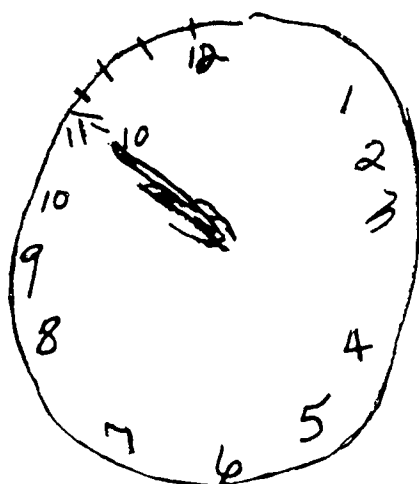
Block Design - 7

Construction-mild

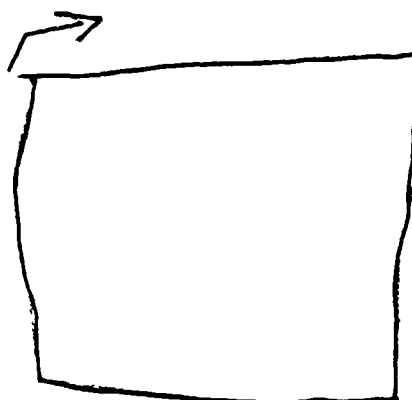
Trails A - 39" 0X
B - 211" 2X

Peseveration on figure drawing
Frontal lobe sign on Clock

WMS Semantic R16(3); 1/2H11(3), %69(2); Figural R4(4);
1/2H3(4), %75(2)

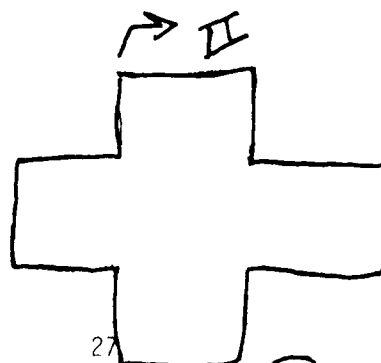
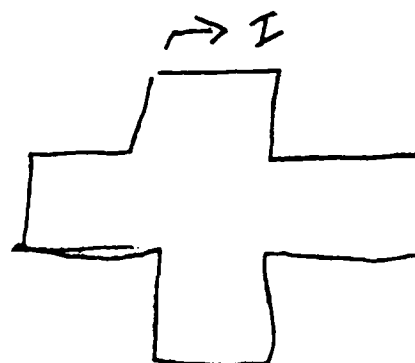


III:10



He shouted the
WARRING

$$\begin{array}{r} 85 \\ - 27 \\ \hline 58 \\ \hline 51 \end{array}$$



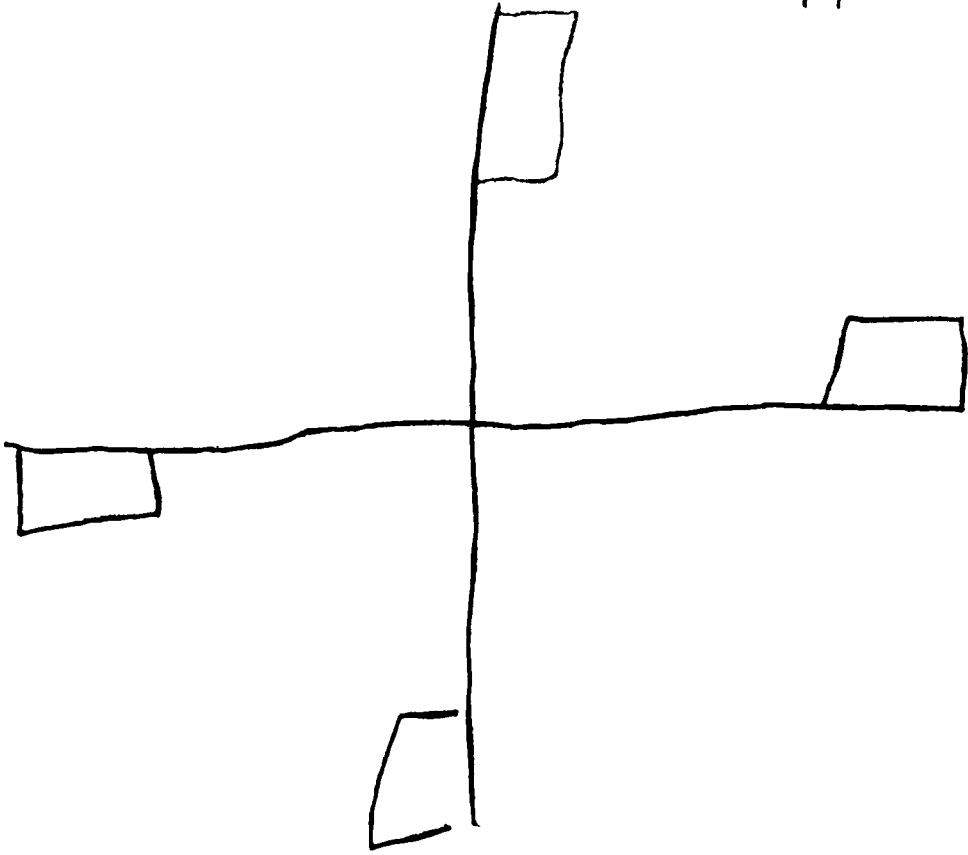
27

CLOCK
Clock

SQUARE

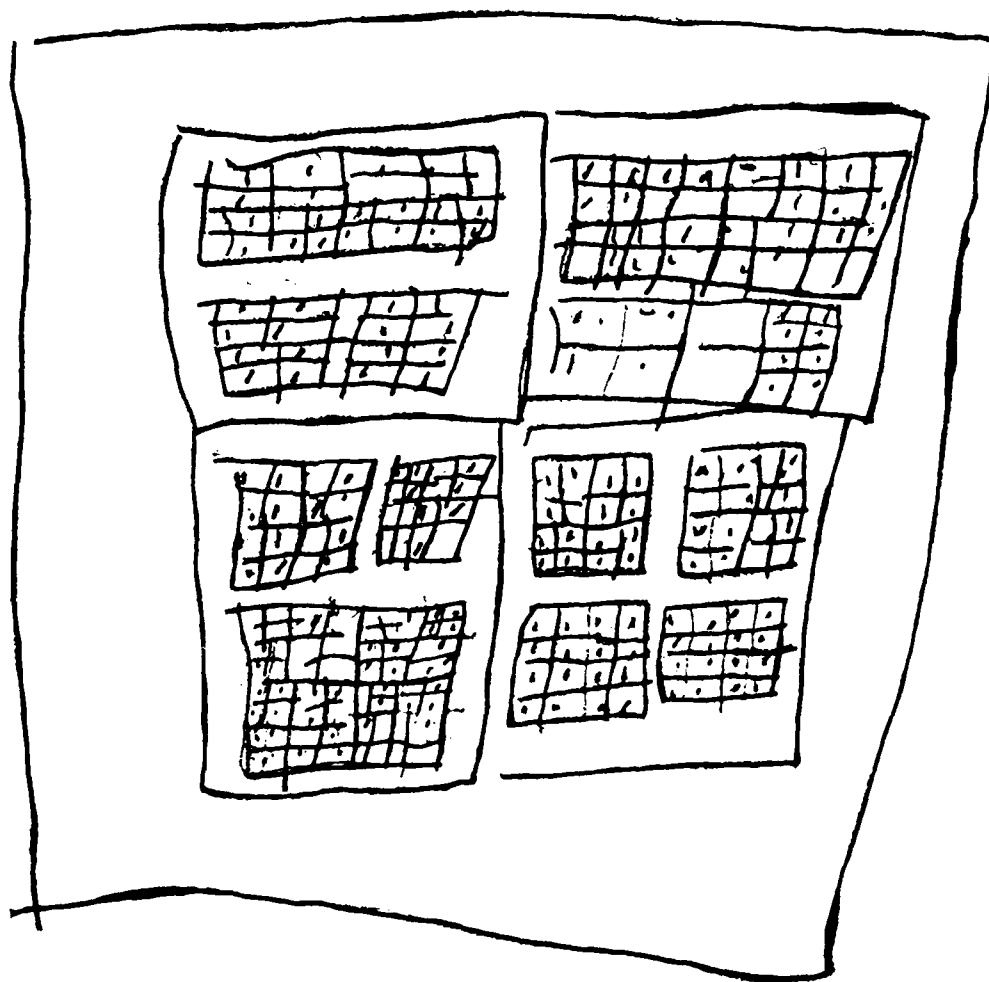
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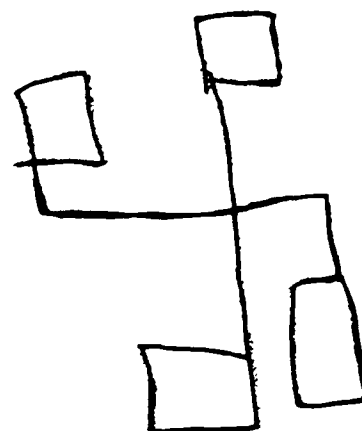


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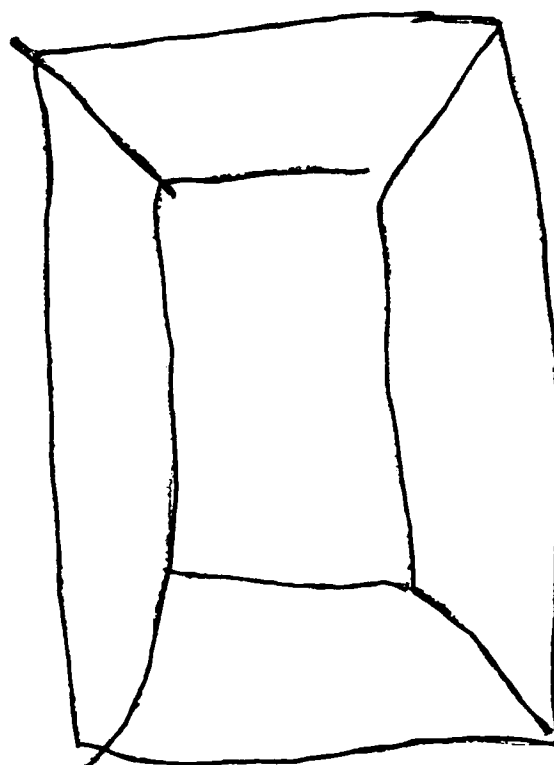
CS

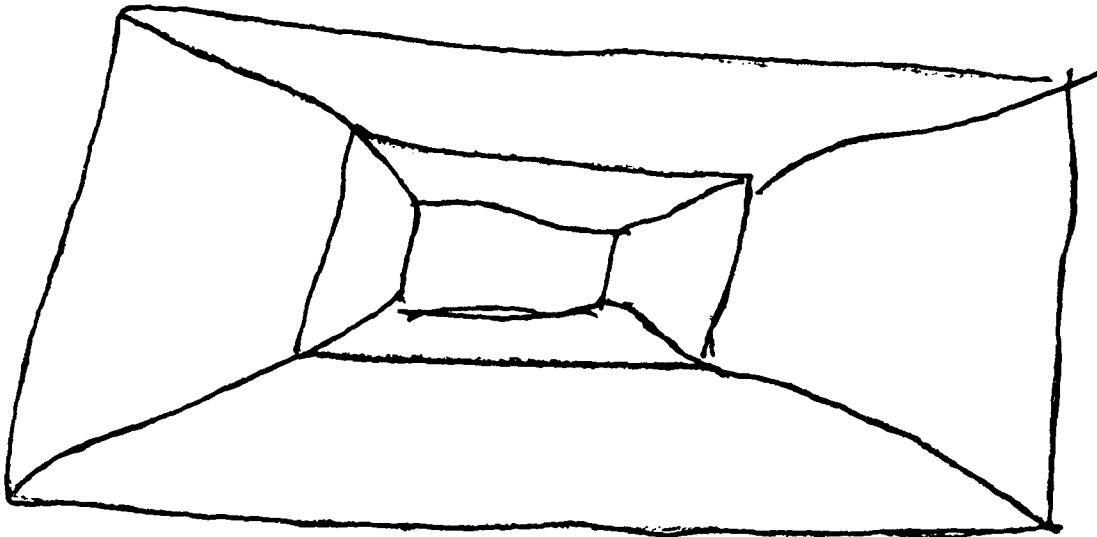


started at bottom right set then bottom left
then top right & top left came back to
bottom left to finish Performance deteriorated as
process continued

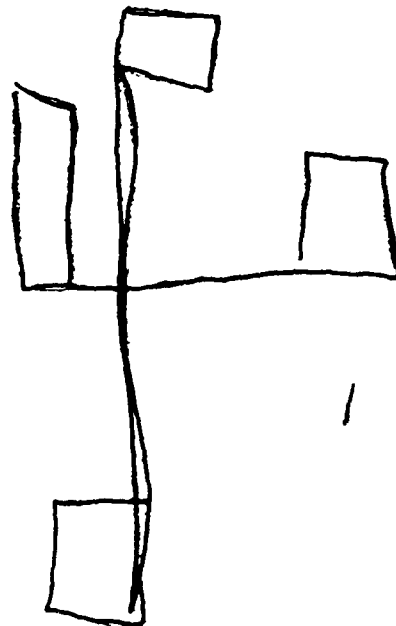
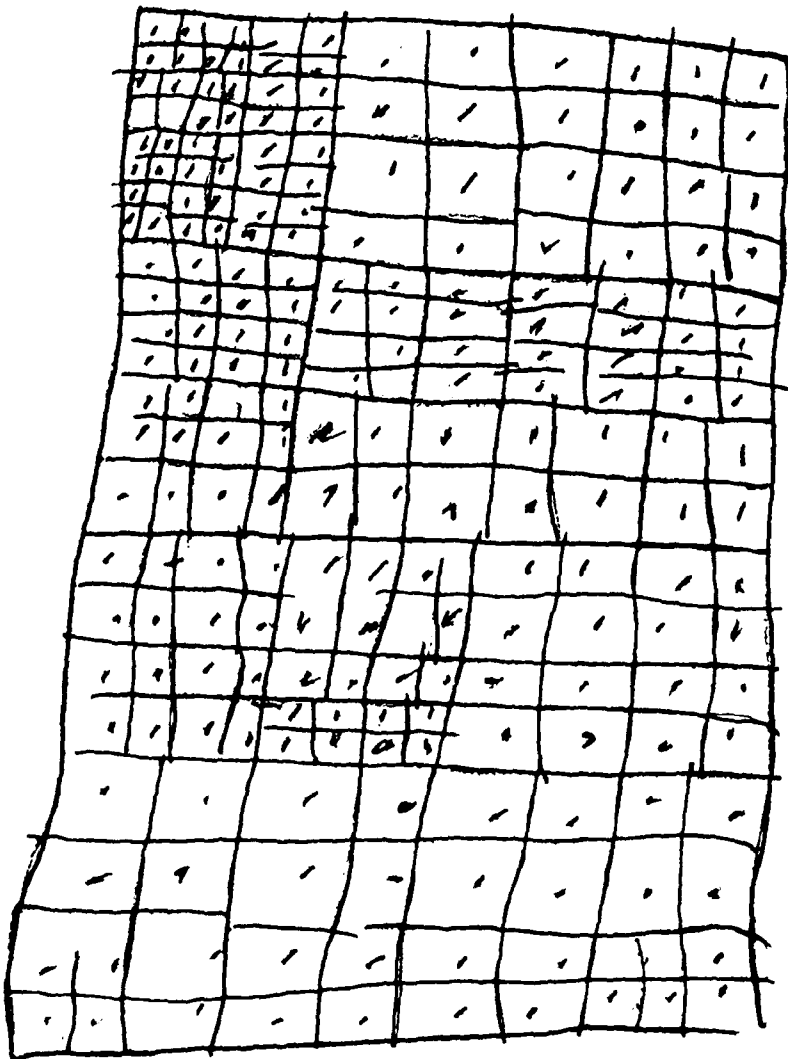


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11



1

Analysis. CS is a case of a gentleman with multiple sclerosis. CS's motor performance is slow bilaterally. However, when one contrasts the performance with the left to the performance with the right, dominant, hand, there is more than a 10% decrement in the performance of the left hand. Since the left hand performance is so much poorer than that of the right in comparing the two sides of the body, the tapping performance would lateralize under the right hemisphere. CS had two right sided and four left sided suppressions to simultaneous, bilateral confrontation stimulation. This performance is impaired, but does not meet the criteria for lateralization and is listed under the nonlateralizing column. Apparently, CS was unable to reliably respond to auditory and visual confrontation stimulation. Fingertip number writing was performed equally poorly on the right and left hands. Since the performance of fingertip number writing does not meet lateralizing criteria this is represented under the center column. Attention and concentration as measured by Digit Span scaled score of 8 is below expectation for someone with 18 years of education who has worked at a relatively high level of Civil Service employment. Also, the Trails A score of 39 seconds is slower than expected and most likely represents mild difficulty with attention and concentration. These performances are listed under the nonlateralizing column heading. CS's Block Design scale score of 7 is also below expectation for someone with 18 years of education and represents difficulty in completing the visual constructive task. This is therefore represented under the right hemisphere column. CS's Token Test performance of 34.5 out of 36 possible points does not meet the cutoff criteria of 32. Since receptive language as reflected by the Token Test is normal, this is placed under the center column. CS has some mild difficulty with the drawings of the Greek Cross. The right side of the figures is somewhat elongated and represents mild constructional difficulty and is placed under the right hemisphere column. More dramatic, however, is the perseveration noted on the 2nd design of the WMS figures. This type of perseveration is often seen in patients who have deterioration of the frontal lobes. This represents an inability to accurately terminate a behavior once initiated. An additional frontal lobe sign is noted in CS's execution of the clock drawing. Here, CS fails to appreciate the setting of the clock with the hands pointing toward the 2 and 11. Additionally, he has written the number 10 after the number 11 which represents a pull of the stimulus command "set the time at 10 after 11." These two observations are listed under the nonlateralizing column. On Trails B CS demonstrates considerable difficulty in simple problem solving. He has problems of mental

flexibility in that he makes two errors in sequencing or shifting from numbers to letters. Although not a specific part of the neuropsychological screening examination CS was requested to write the sentence "He shouted the warning." He misspelled warning as "warring" and this represents a mild language dysfunction and is listed under the left hemisphere column. CS has mild difficulty with recall and delayed memory of short stories and moderate difficulty of recall of visual presentations of simple geometric figures. The layout of the data show evidence of problems in both the left and right hemisphere with indicators of deficits which are nonlateralizing. Thus, the indication for CS is that something is wrong with his brain behavioral functioning warranting further evaluation by a neuropsychologist and neurologist..

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APPENDIX

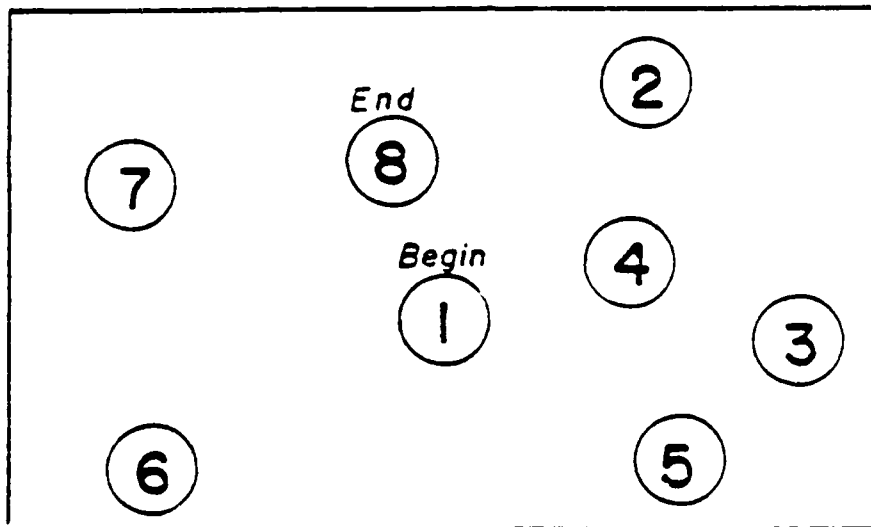
Name _____
Date _____ Ex. _____

TRAIL MAKING

ADULT

Part A

SAMPLE



15

17

21

20

19

16

18

4

22

5

6

13

Begin

1

24

14

7

2

8

10

3

9

End
25

11

23

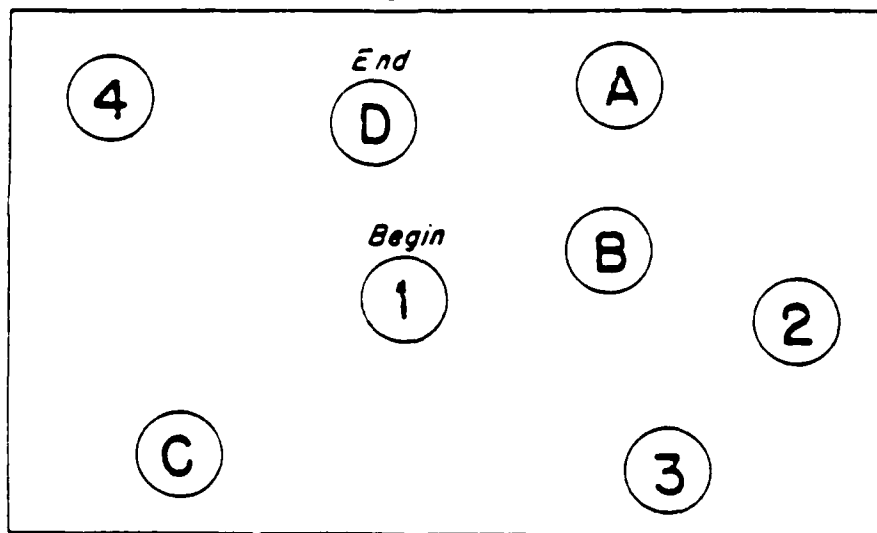
12

NAME _____
DATE _____ EX _____

TRAIL MAKING

ADULT
Part B

SAMPLE



End

13

10

8

9

1

D

B

4

3

Begin

1

7

5

H

C

12

G

A

J

2

6

L

E

F

11

K

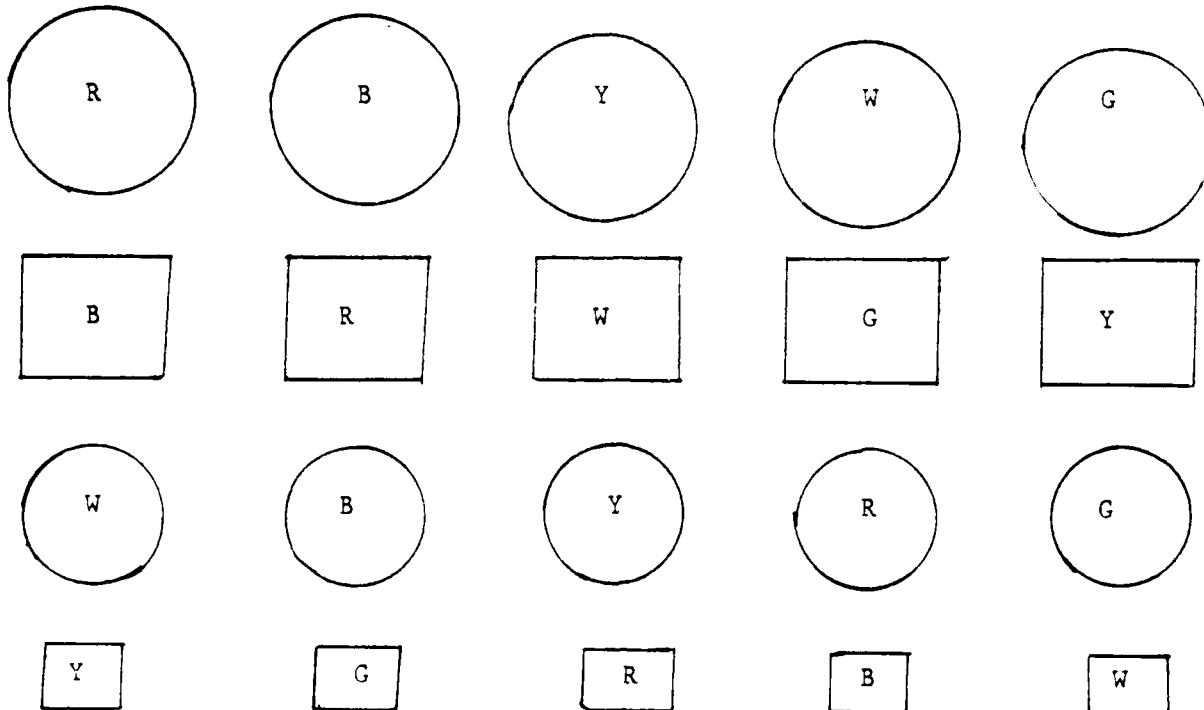
TOKEN TEST
(36 Item Form)

NAME:

DATE:

AGE:

SEX:



Allow one repetition per command. Score one if correct on first trial and .5 if correct on second trial. Write incorrect response above the item. Underlined words represent component score which is scored on first trial.

Part 1. Arrange tokens as displayed above;
smallest tokens nearest patient.

Component
Score

Score

- | | |
|---------------------------------|----|
| 1. Touch a <u>circle</u> . | /1 |
| 2. Touch a <u>square</u> . | /1 |
| 3. Touch a <u>yellow</u> token. | /1 |
| 4. Touch a <u>red</u> one. | /1 |
| 5. Touch a <u>black</u> one. | /1 |
| 6. Touch a <u>green</u> one. | /1 |
| 7. Touch a <u>white</u> one. | /1 |

Part 2. Remove the small tokens.

- | | |
|--|----|
| 8. Touch the <u>yellow square</u> . | /2 |
| 9. Touch the <u>black circle</u> . | /2 |
| 10. Touch the <u>green circle</u> . 40 | /2 |
| 11. Touch the <u>white square</u> . | /2 |

	Component Score	Score
Part 3. Add the small tokens.		
12. Touch the <u>small white circle</u> .	/3	
13. Touch the <u>large yellow square</u> .	/3	
14. Touch the <u>large green square</u> .	/3	
15. Touch the <u>small black circle</u> .	/3	
Part 4. Remove the small tokens.		
16. Touch the <u>red circle</u> and the <u>green square</u> .	/4	
17. Touch the <u>yellow square</u> and the <u>black square</u> .	/4	
18. Touch the <u>white square</u> and the <u>green circle</u> .	/4	
19. Touch the <u>white circle</u> and the <u>red circle</u> .	/4	
Part 5. Add the small tokens.		
20. Touch the <u>large white circle</u> and the <u>small green square</u> .	/6	
21. Touch the <u>small black circle</u> and the <u>large yellow square</u> .	/6	
22. Touch the <u>large green square</u> and the <u>large red square</u> .	/6	
23. Touch the <u>large white square</u> and the <u>small green circle</u> .	/6	
Part 6. Remove the small tokens.		
24. Put the <u>red circle</u> on the <u>green square</u> .	/5	
25. Touch the <u>black circle</u> with the <u>red square</u> .	/5	
26. Touch the <u>black circle</u> and the <u>red square</u> .	/4	
27. Touch the <u>black circle</u> or the <u>red square</u> .	/2	
28. Put the <u>green square</u> away from the <u>yellow square</u> .	/5	
29. If there is a <u>blue circle</u> , touch the <u>red square</u> .	/0	
30. Put the <u>green square</u> next to the <u>red circle</u> .	/5	
31. Touch the <u>squares slowly</u> and the <u>circles quickly</u> .	/4	
32. Put the <u>red circle</u> between the <u>yellow square</u> and the <u>green square</u> .	/7	
33. Touch <u>all</u> the <u>circles</u> , <u>except</u> the <u>green</u> one.	/4	
34. Touch the red circle - NO - the <u>white square</u> .	/2	
35. Instead of the white square, touch the <u>yellow circle</u> .	/2	
36. In addition to touching the <u>yellow circle</u> , touch the <u>black circle</u> .	/4	
	<hr/> /116	

IMPAIRMENT INDICES IN NEUROPSYCHOLOGY USES AND ABUSES

Lloyd I. Cripe, Ph.D.¹

Why present a paper on impairment indices? First, I have always been intrigued by summary indices (Full Scale Intelligence Quotient, Wechsler Memory Scale Quotient, the Halstead Impairment Index, etc.). The condensation of complex human behavior to a summary number from a limited sample of behavior (Person-->Behavior on Test-->Summary Numbers) seems fraught with potential problems. At best, it is risky and at worst it is absurd. Such an effort needs to be carried out with thoughtfulness and caution. The second reason for presenting this paper is based upon observing considerable haphazard use of indices. While reviewing numerous neuropsychological evaluations from clinical psychologists and neuropsychologists working in clinical and forensic settings, I have noted significant variance regarding the rationale, use and interpretation of impairment indices. All of this has caused me to rethink my ideas regarding the meaning of impairment indices, what they are and are not and has resulted in less reliance upon them. I want to share my thinking with you hoping you will reexamine, if necessary, your assumptions underlying the use of Impairment Indices and adjust your clinical practices if you so chose. We will start by exploring the origin of Impairment Indices in neuropsychology.

WHO CREATED THEM?

Ward Halstead originated the idea of an impairment index in neuropsychology. In his published study of Brain and Intelligence in 1947 (Halstead 1947) he made the following comments regarding the Halstead Impairment Index (HII):

"...It was decided to construct an index to reflect brain-injury factor and for the present to regard the information yielded by the other indicators as supplementary.

The ten tests having the highest t value (i.e., differentiating power) for brain-injury factor were accordingly selected as the basis for an impairment index. In this arrangement an individual whose scores fall below the criterion scores on all ten of the key

¹My thanks to Carl B. Dodrill, Ph.D. for use of his data pool and help with data analysis for this paper.

tests for brain-injury factor thus has an impairment index of 0.0; while, on a simple proportion basis, an individual who satisfies the criterion score on three of ten key tests has an impairment index of 0.3, or on all of the key tests, an impairment of 1.0...the ten key tests are not equally sensitive for brain-injury factor...they do not contraindicate thinking of the scale as a reflector of probability that a brain-injury factor is present. In other words, the index, as now constructed, may be thought of as a statement of empirical odds out of ten chances that a given individual has an impairment of cortical brain functions at the time of testing..." page

The cutoff for making the decision of brain dysfunction was set at 0.5 or five tests in the impaired range. The impaired range cutoff was established by studying T-scores between the various tests of the controls and brain-injured and setting a score which would best separate or discriminate the groups. The determination of the cutoff score for the HII was based on observations that normals in the study did not have an Impairment Index of .5 or greater. One subject had an impairment score of 0.4. This troubled Halstead, because he thought the HII should be primarily brain sensitive and not affected by other factors. He quickly rationalized "...In the case of Subject 4, it is believed that the presence of mild clinical depression (associated with the imminence of induction into the armed services) contributed directly to this relatively high index for a 'normal' individual." This seems amusing, given we have gathered at a military conference. If he thought induction into the armed services might adversely affect a person's impairment index, what would Dr. Halstead speculate regarding the impairment index of a person who spends 20+ years in the armed services!

Halstead (1947) obtained the following distribution of Impairment

Insert Figures 1 & 2 about here

Indices for his overall group (See Figure 1). The three groups in his study demonstrated the following distribution (See Figure 2). He drew the following conclusions regarding the impairment index:

o In comparison with other types of subjects, individuals with damage to the frontal lobes have high impairment-index scores. The mean impairment index for frontal lobectomies was found to be about six times that for normal control subjects and about three times that for nonfrontal lobectomies.

o There is no relation between the degree of impairment and the extent of the lesion. The obtained correlations are

not significantly different from zero.

- o Bilateral subcortical lesions of the frontal lobes, as in lobotomies, do not disturb the functions reflected by the impairment index.

- o The impairment of functions reflected by the impairment index is independent of psychometric intelligence.

Reitan later reduced the number of tests required to calculate the impairment index to seven. Reitan has always been clear that the index is used as a general sensitive measure and warns against using the index to determine the degree of impairment. Because the index is determined by cutoff scores, persons may get the same impairment index with varying levels of performance on a given measure. For example, with Halstead's cutoffs a Category Test score of 51 errors contributes to an impairment index to the same extent that at Category Test score of 110 errors. Reitan found the Impairment Index to be one of the most sensitive indicators regarding the presence or absence of brain dysfunction. Recently (Reitan & Wolfson 1985), he states that "...the Halstead Impairment Index is a consistency-of-impairment index rather than a severity-of-impairment index."

Reitan (1974) has long argued for a multiple method of inference in understanding the neuropsychological functioning of the person from test performances. According to Reitan, consideration of level of performance, right and left indicators, specific deficits and signs, and patterns is required to determine the neurobehavioral problems associated with neuropathologies affecting the higher brain system of a particular individual.

Dodrill (1978) expanded the Halstead-Reitan Battery and developed

Insert Table 1 about here

the Dodrill Discrimination Index (DDI). This index is composed of 16 test scores (See Table 1). Cutoffs were established to maximally discriminate 75 percent of the normal controls. The percent of tests outside normal limits has proven to be a valid and reliable discriminator of brain dysfunction. The ability of the DDI to discriminate normals from brain impaired subjects has proven more successful than the HII especially with more subtle neurobehavioral conditions.

Dodrill in his 1978 validation study suggested that the percent of tests outside of normal limits was related to degree of brain dysfunction. He suggested the following classifications:

% TESTS OUTSIDE OF NORMAL LIMITS

0-30% = Normal
30-40% = Borderline
40-50% = Very Mild
50-70% = Mild
70-90% = Moderate
90-100 = Severe

This classification was based upon "experience with the battery." This was offered as a classification of severity of impairment, although the DDI is based upon cutoff scores alone with no consideration of varying levels of performance on a given test and no validation of this scheme to determine if severity of neurological findings or real world adaptation was related to the DDI. This appears to be an arbitrary conclusion assuming a relationship between the index and level of performance which may or may not exist for a group or individual.

Another approach in creating an index was the Average Impairment Rating (AIR) of Russell, Neuringer and Goldstein (1970). The AIR is different from the HII and the DDI because of its construction and sensitivity to degree of impairment. This index rates each of 20 measures according to six levels of performance. An average rating is calculated which then allows a determination of the degree of impairment. In essence there are multiple cutoff scores for each test and the test performance is classified somewhere along a continuum of normal to severely impaired. The AIR considers level of performance for each measure which makes it more than a discriminator of brain dysfunction. It can address severity of impairment.

Reitan has more recently developed and marketed the Neuropsychological Deficit Scale (NDS). This index is composed of 42 variables. Each variable is rated according to level of performance. The summary NDS is a single score which proposes to discriminate the presence and absence of brain dysfunction and indicates overall severity. Although Reitan thinks this index is a decided improvement over previous indices, there is no published research regarding the NDS.

WHAT ARE THEY?

The remainder of this presentation will focus on the HII and the DDI. Let us now consider what the indices are.

To understand impairment indices, we will look at normal and brain damaged groups. Table 2 describes the samples used for this study.

Insert Table 2 about here

The average HII of the normals is 0.18, while the average HII for the damaged group is 0.55. These means are clearly statistically different. Figures 3 and 4 present the distribution of the indices for the normal and brain damaged groups. The distribution of the HII and the DDI is skewed right for the brain impaired group and skewed left for the normals.

Insert Figures 3 and 4 about here

By using the conventional cutoff score of 0.5 for the HII, very few of the normals are misclassified, there is considerable misclassification of the damaged group (false negatives). By adjusting the cutoff to 0.35, the classification is better, with only 26% of the normals falsely classified as impaired and 24% of the damaged classified as unimpaired (See Figure 5). With the DDI the best discrimination occurs if the cutoff is set at 31-38%

Insert Figures 5 and 6 about here

of tests outside normal limits, although considerable false positives will occur with the normals (23%) and (24%) false negatives with the damaged (See Figure 6).

The ability of impairment indices to correctly classify patients into brain impaired and normal groups has varied from study to study depending upon setting and patient population. In some settings the classification is in the 80-90+% range. In other populations it has been 60% or lower.

Table 3 summarizes the most significant correlations between the

Insert Table 3 about here

HII, age, education, FSIQ, Trails B, Category test, and the DDI. There is some positive correlation with age, but it is not high with this sample. This appears affected by the sample distribution. The mean age of the groups is in the high twenties although the range is 16-70. Larger numbers of subjects in the older range would likely result in a higher correlation between the HII and age. It is interesting to note how highly the indices correlate with IQ. The DDI is similarly correlated with

Insert Table 4 about here

age, education, FSIQ, Trails B, and the Category Test (See Table 4).

Figure 7 presents a distribution of the average HII according to IQ groupings. This demonstrates the strong relationship between

Insert Figure 7 about here

IQ and the index. Although the damaged group consistently has a higher index than the normal group for given IQ's, it is clear that both normals and damaged persons with low IQ's have high impairment indices and they have low indices with high IQ's. Cutoff scores placed for maximum discrimination at the mean IQ ranges have a high misclassification rate at the low and high ends of the IQ ranges. The 0.5 cutoff as indicated earlier leads to numerous misclassifications between these groups. Figure 8 indicates the relationship of the DDI to IQ groupings. The same relationship with IQ as the HII is revealed.

Insert Figure 8 about here

By adjusting the cutoffs to the best discrimination level, the indices discriminate between the two groups at 75+% accuracy. By using previously defined cutoffs, such as 0.5 for the HII, there is poor classification. However, even when the best cutoffs for these groups are used, as IQ varies from the mean IQ, serious misclassification problems occur. This type of misclassification results from relying solely upon the Impairment Index cutoff.

HOW CAN THEY BE ABUSED AND USED?

Perhaps the most common abuse is using the index as an indicator of degree of impairment. Because the index is calculated by how many tests fall outside cutoffs, there is a ceiling affect upon how sensitive it can be as a level of performance indicator. For example, a score of 51 errors on the Category Test, using Halstead's norms, weighs just as much to the index as a score of 120 errors. Therefore, a person can have an extremely poor performance on one measure, related to severe impairment in a particular higher cortical function, and do well on the other measures in the index. This can lead to a ceiling or averaging effect which camouflages the severity of impairment. Only by looking at the multiple measures involved, the distribution of norms for damaged and nondamaged persons, and considering individual variance, discriminations regarding the level of performance and severity of impairment can be made.

Another abuse involves relying too heavily upon the index as a discriminator. The discrimination ability of any index is limited. The establishment of a cutoff score is somewhat arbitrary and always involves a compromise between sensitivity

and selectivity. By setting cutoffs high, the discriminations will be very selective, but will result in poor sensitivity or false negatives. By setting the cutoffs low, the discriminations will be very sensitive, but result in poor selectivity or false positives. This fact of decision criteria combined with the variability of human performances, be they normal or damaged, limits the precision of the index as a discriminator. Multiple sources of information are necessary for the clinician to make the decision of the presence or absence of brain dysfunction. To rely heavily upon a single index is an oversimplification and distortion of the nature and intent of indices.

Neglecting or Forgetting the relationship between IQ and the indices is another abuse. A single cutoff score is prone to serious misclassification of persons at the low and high ends of intellect. Although they do not currently exist, there is a need to have norms with multiple cutoff scores at various levels of intellectual ability to avoid misclassification because of intellect. Presently, the clinician must be aware of this limitation and adjust decision rules for different levels of intellect when interpreting Impairment Indices. Patient's with high IQ's and brain dysfunction may have very low HII's and very substantial impairments. Likewise, persons with low intelligence and normal brain functioning may have a high HII and have no neurologically significant brain dysfunction.

Finally, a failure to recognize the many factors which can confound neuropsychological test performances can lead to a misuse of the Impairment Index. Poor performance on tests can be

Insert Table 5 about here

linked to many issues which have little or no relationship to neuropathology. Impairment Indices can be confounded by many of these factors (See Table 5).

Despite the limitations of the Impairment Indices, they can be useful in assessing brain dysfunction and making clinical decisions. They are appropriately used as an aid in discriminating the presence or absence of brain dysfunction. The Impairment Index is a statistically derived probability measure based on preselected cutoff scores which tries to predict the presence or absence of brain dysfunction by a summary score. Ward Halstead's statement that the HII was "a reflector of probability that a brain-injury factor is present," accurately describes the index.

Impairment indices would be better named DISCRIMINATION INDICES. The word impairment tends to be associated in our thinking with degree or extent. This may be a reason why these indices are prone to misinterpretation. The HII and the DDI are simply limited statistical guesses as to the likelihood that a patient's

group of test performances are like those of persons with brain dysfunction. They say little to nothing about level or severity of impairment. They say little about a particular individual. They say nothing about where the impairment may be or etiology. As an aid to discrimination they are one of many variables that a clinician must consider in determining the presence or absence of brain based neurobehavioral problems in an individual.

Because of the potential for misinterpretation, Impairment Indices should be carefully reported. The following statement is suggested when describing the HII or DDI in a neuropsychological evaluation report:

...General indices of neuropsychological functioning are in the impaired ranges. The Halstead Impairment Index was 0.9. The Dodrill Discrimination Index indicated 14 out of 16 measures (88%) were in the impaired ranges. Neuropsychological Indices are global measures which try to predict the probability of brain dysfunction based on the patient's overall test performances. In this patient's case, the indices are clearly in the impaired ranges and predict the presence of brain dysfunction. A more specific analysis of the data is required, considering a variety of factors, to more precisely determine the presence, extent, locus and nature of impairments...

CONCLUSIONS

Impairment Indices in Neuropsychology were invented by Dr. Ward Halstead and elaborated upon by others. He saw his index as a reflector of the probability that brain-injury was present. Although some of his conclusions about the index were inaccurate, his definition of the index is accurate. Dr. Ralph Reitan has emphasized the same point and clearly stated that the HII is not a severity-of-impairment indicator.

Impairment Indices are probability statements based on selected cutoff scores. They are not a substitute for a comprehensive analysis of all relevant information. The process of analyzing neuropsychological tests to make logical inferences requires several important steps:

- o Comparing the patient's performances with standardized norms (which includes considering global measures such as impairment indices).
- o Comparing the patient's performances with known or estimated premorbid performances.
- o Comparing intra-patient performances and various

higher cortical functions.

- o Comparing functions of the two hemispheres.
- o Identifying specific or pathognomonic signs
- o Comparing all findings with known syndromes.
- o Integrating all the findings into a diagnostic conclusion.

Because there are no "average or summary individuals" in the clinic, and Impairment Indices are global measures based upon statistical concepts of average, and can be confounded by many issues unrelated to brain condition, Impairment Indices need to be seen as a small part of the entire analysis and used cautiously recognizing their limitations.

An impairment index can be seen as one of many tools used in the process of neuropsychological assessment, but it is a single tool within an entire workshop filled with tools. A skillful craftsman knows the workshop, the gamut of tools, their strengths, weaknesses and limitations. He or She selects and applies the tools wisely. Hopefully, a better understanding of Discrimination Indices will result in more skillful use and the avoidance of abuse.

References

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Table 1. Dodrill's Modification of the Halstead Reitan Battery

16 MEASURES OF THE DDI (DODRILL DISCRIMINATION INDEX)

Stroop I	Tactual Performance
Stroop II-I	-- Total Time
Wechsler Memory Verb	-- Memory
Wechsler Memory Vis	-- Localization
Sensory Percep Errors	Rhythm Test
Name Writing (Let/Sec)	Tonal Memory Test
Category Test	Finger Tapping (Total)
Aphasia Screening	Drawings

INDEX = PERCENT OF TESTS
OUTSIDE OF NORMAL LIMITS

E.G. 8/16 (50%)

Table 2. Description of Samples

DESCRIPTIVE STATISTICS

NORMALS (N=125) DAMAGED (N=609)

<u>VARIABLE</u>	<u>MEAN</u>	<u>RANGE</u>
<u>NORMALS</u>		
AGE	29.4 (12.0)	16 - 70
EDUCATION	12.7 (2.3)	7 - 18
FSIQ	112.6 (12.6)	75 - 145
DDI (%)	18.6 (17.5)	0 - 75
HII	0.18 (0.18)	0.0 - 0.7
<u>DAMAGED</u>		
AGE	28.8 (10.1)	16 - 66
EDUCATION	11.7 (2.7)	0 - 20
FSIQ	95.1 (15.3)	50 - 142
DDI (%)	57.8 (28.3)	0 - 100
HII	0.55 (0.3)	0.0 - 1.0

Table 3. Halstead Impairment Index Correlations

HII CORRELATIONS

	<u>Normals</u>	<u>Damaged</u>
AGE	.17	.18
EDUCATION	-.40	-.42
IQ	-.66	-.70
TRAILS B	-.66	-.62
CATEGORY	-.75	-.75
DDI (%)	.86	.88

Table 4. Dorrill Discrimination Index Correlations

DDI CORRELATIONS

	<u>Normals</u>	<u>Damaged</u>
AGE	.14	.10
EDUCATION	-.52	-.48
IQ	-.73	-.78
TRAILS B	-.78	-.69
CATEGORY	-.77	-.75
HII (%)	.86	.88

Table 5. Issues which can confound

ISSUES WHICH CAN CONFOUND NEUROPSYCHOLOGICAL TESTS

Test Administration	Poor Motivation
Peripheral Problems	Anxiety
Fatigue	Depression
Psychosis	Medications
Medical Problems	Manipulation
Hysteria	Litigation
Pain	Alcohol
Antagonism	Previous Assessments
Age	Cultural Background
Premorbid Intelligence	Learning Disability
Attention Problems	Examiner Bias
Examiner Experience	Examiner Knowledge
Stress	Education
Expectations	Test Selection
Norms Used	Language Problems
Course of Illness	Test Setting

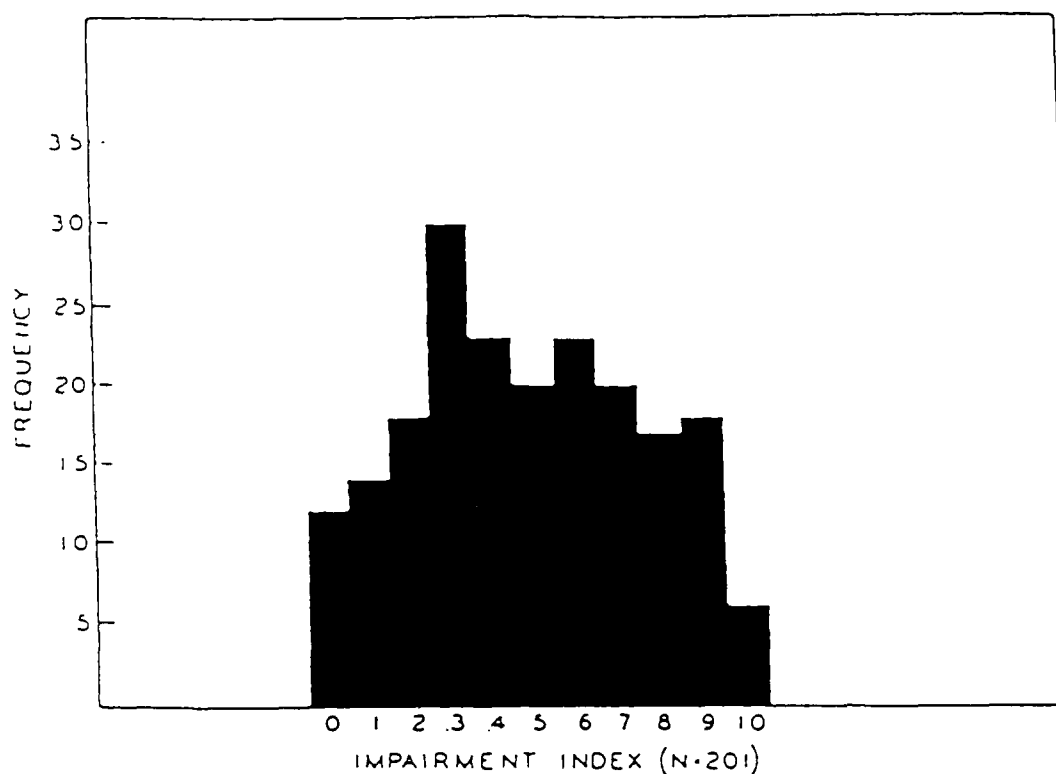


Figure 1. --Distribution of Halstead impairment index in 201 individuals. Note suggests similarity to so-called "normal" or Gaussian distribution curve.

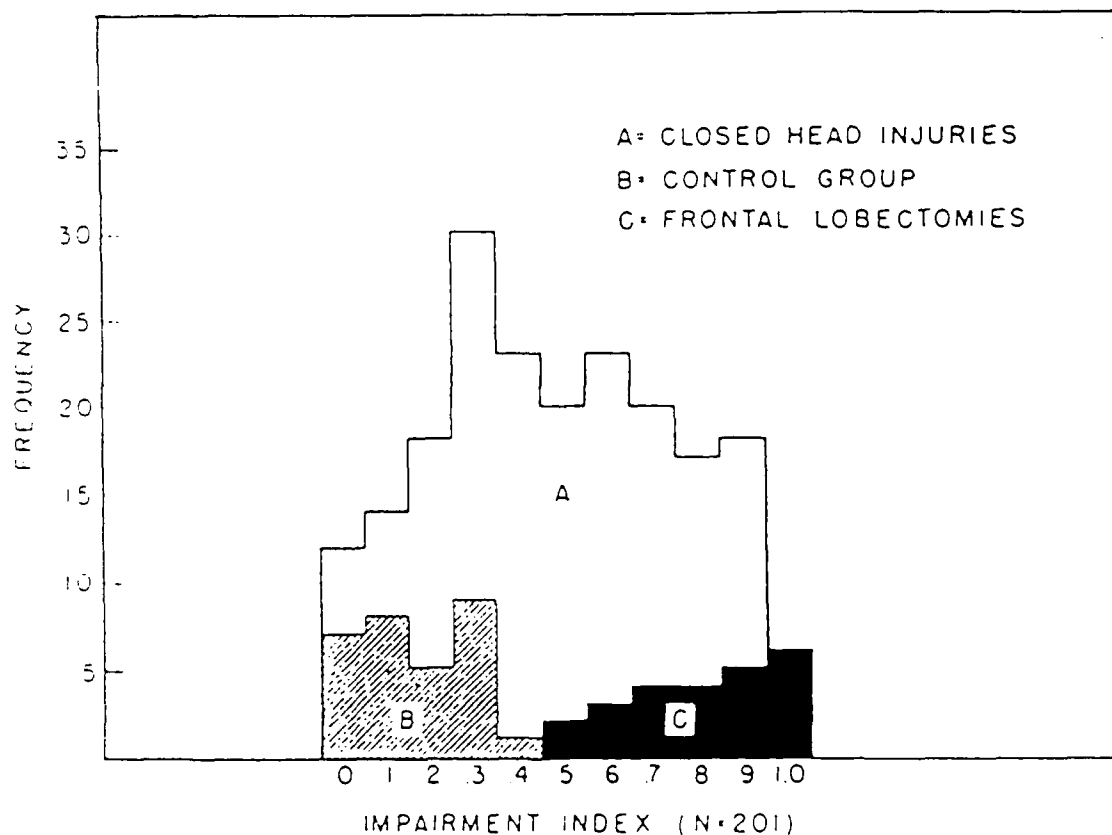


Figure 2. Distribution of Halstead impairment index in *A*, closed-head-injury patients; *B*, control group; and *C*, frontal lobectomies. Note that a considerable number of the cases in *A* have impairment-index scores similar to frontal lobectomies in *C*.

Figure 3. Distribution of HII for Normal and Brain Damaged

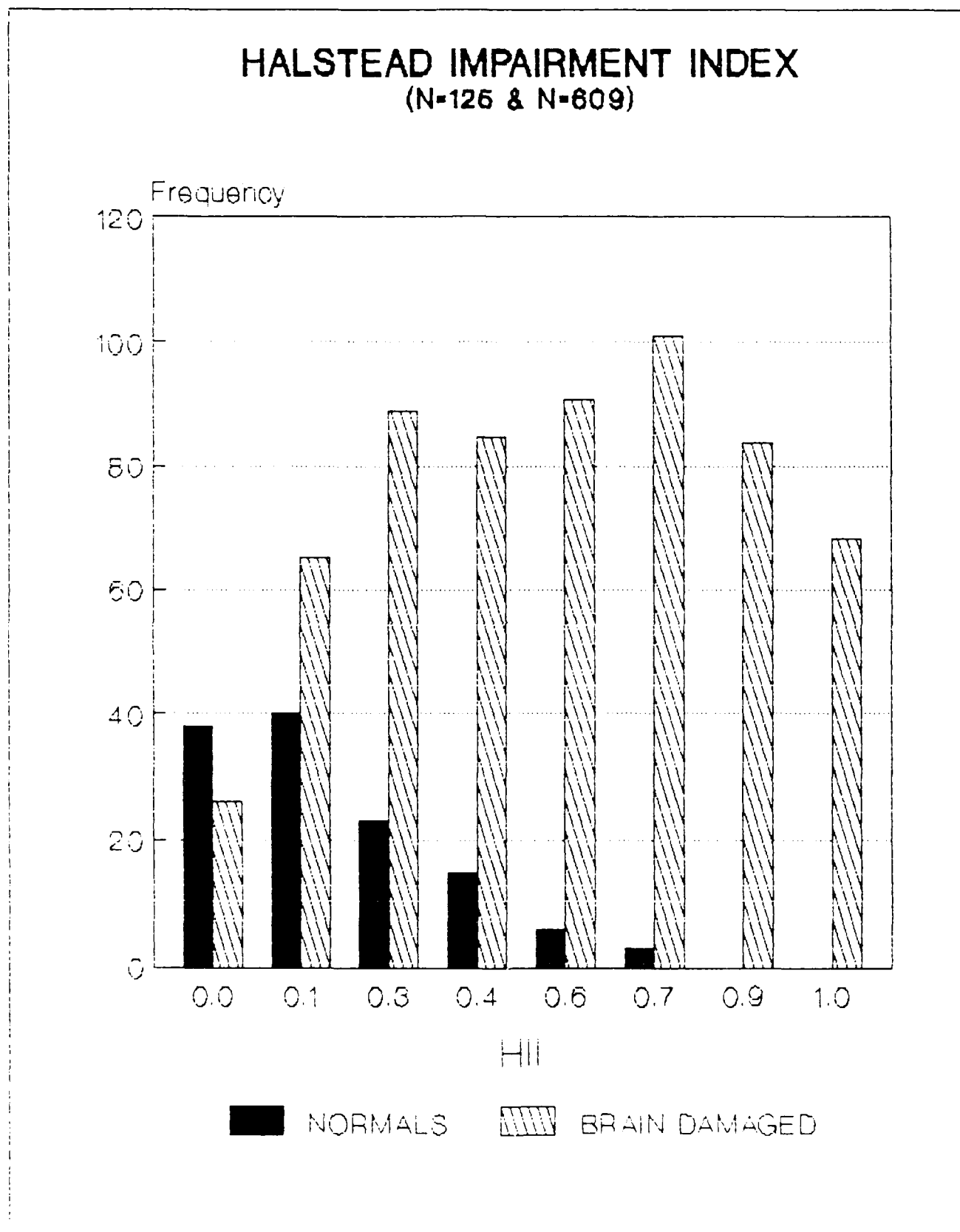


Figure 4. Distribution of DDI for Normal and Brain Damaged

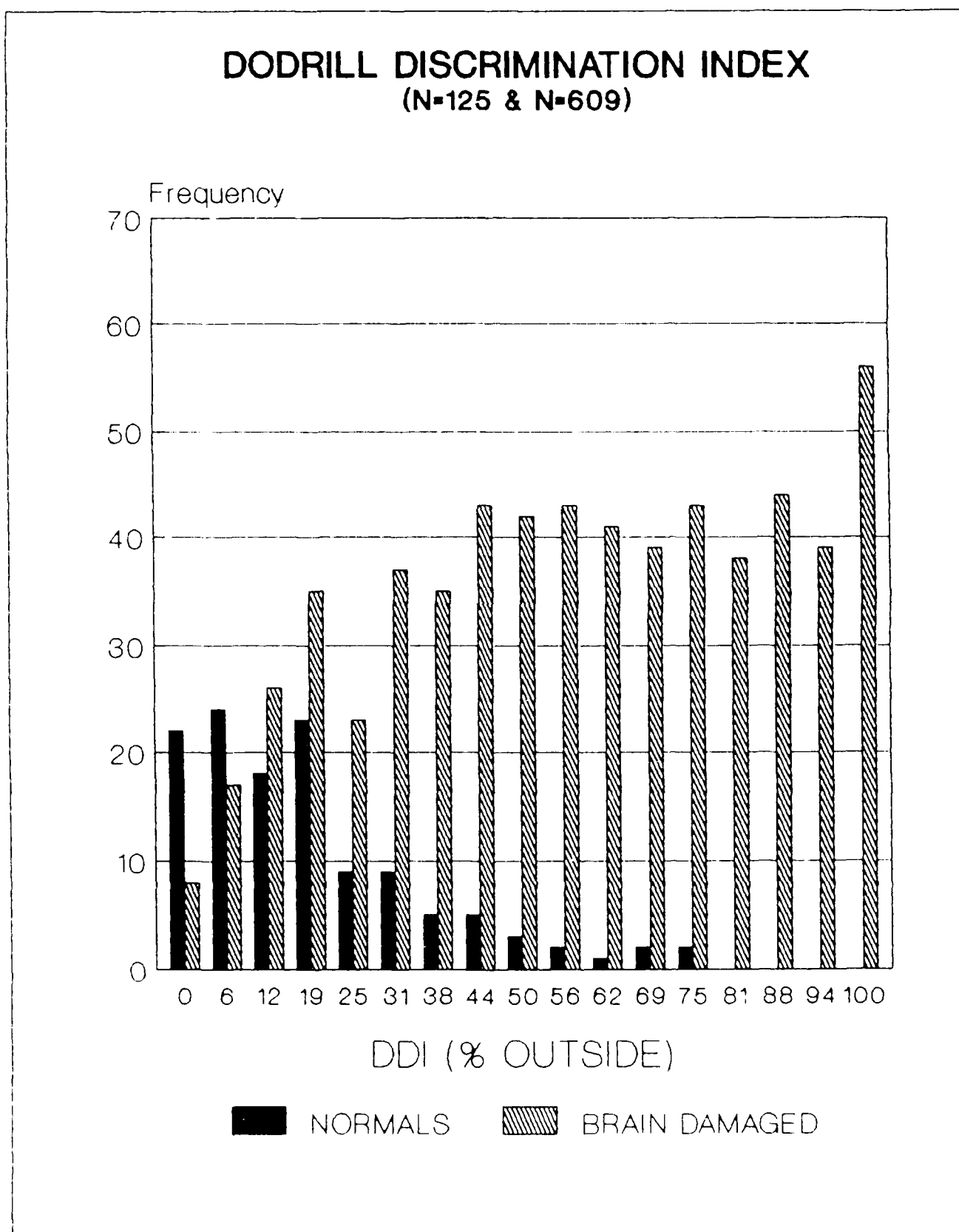


Figure 5. Cutoff Scores for the HII

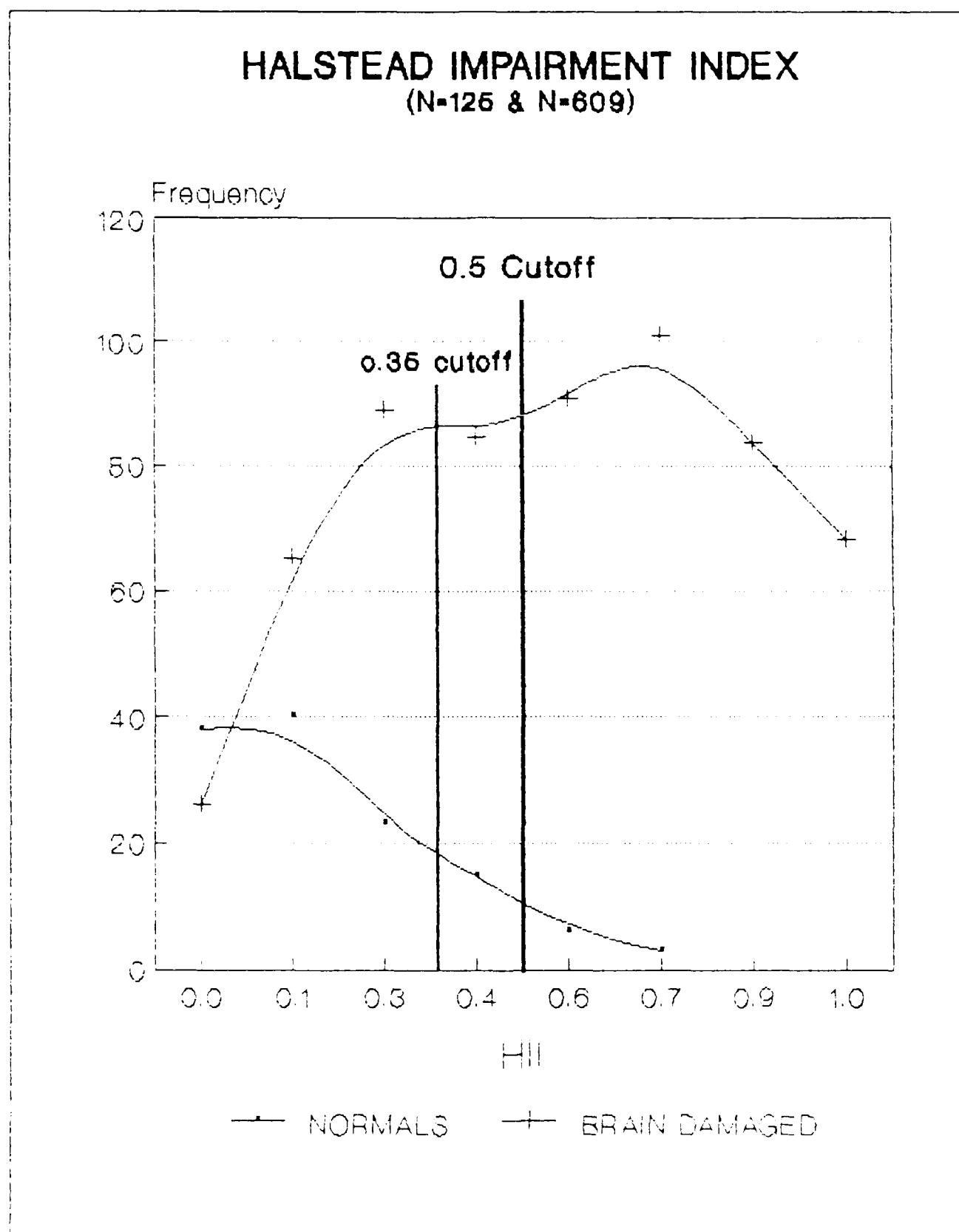


Figure 6. Cutoff Scores for the Dodrill Discrimination Index

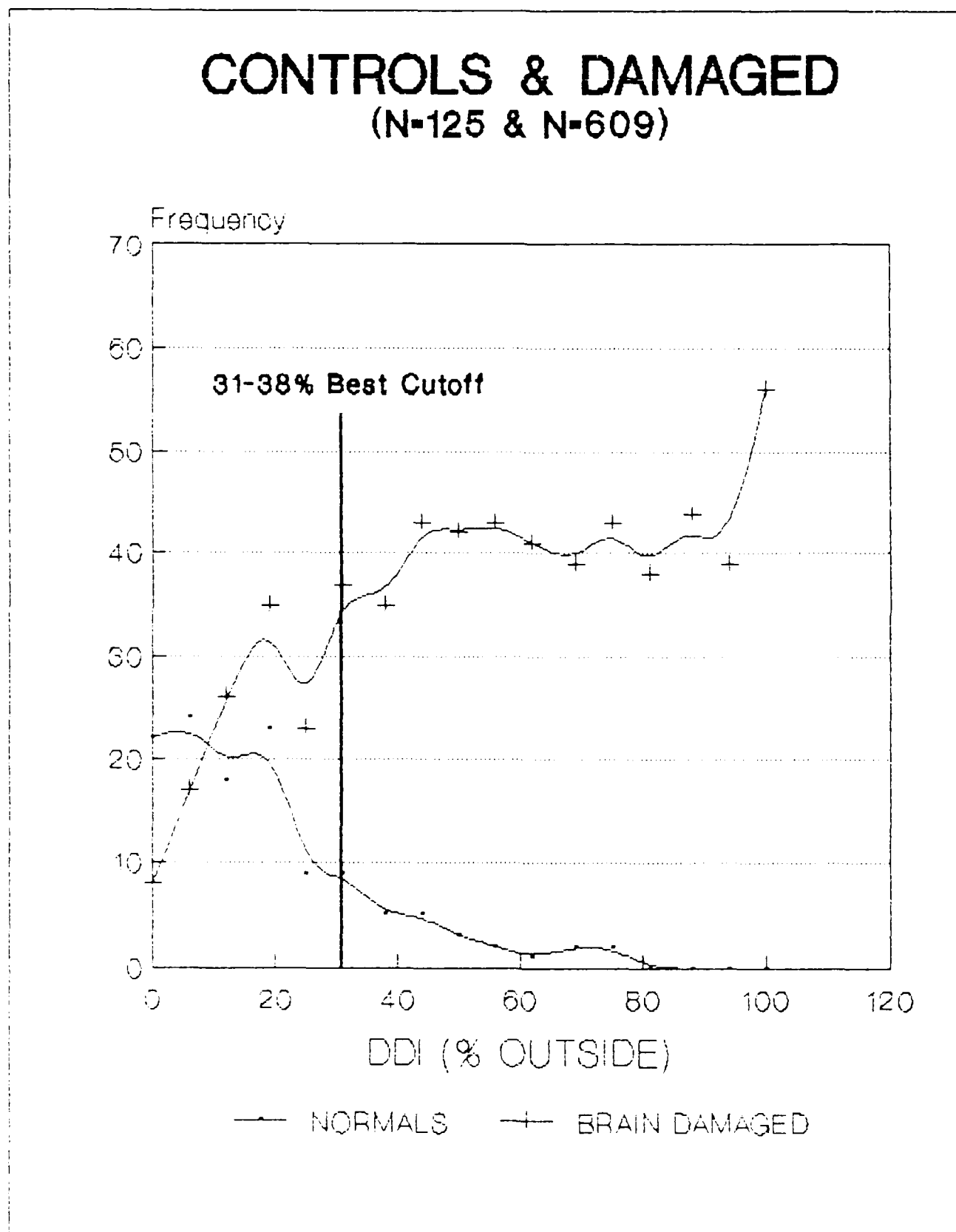


Figure 7. Halstead Impairment Index by IQ Groups

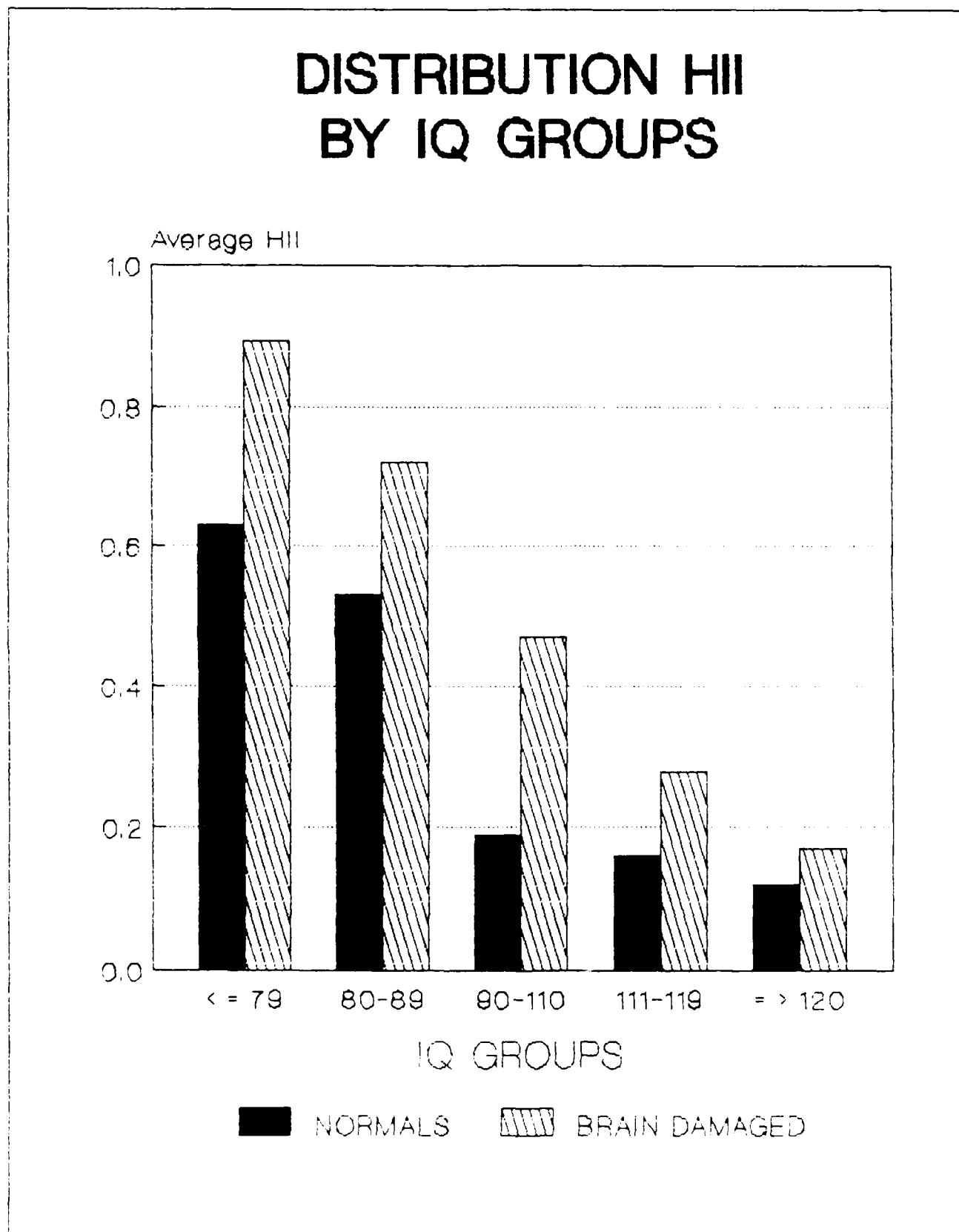
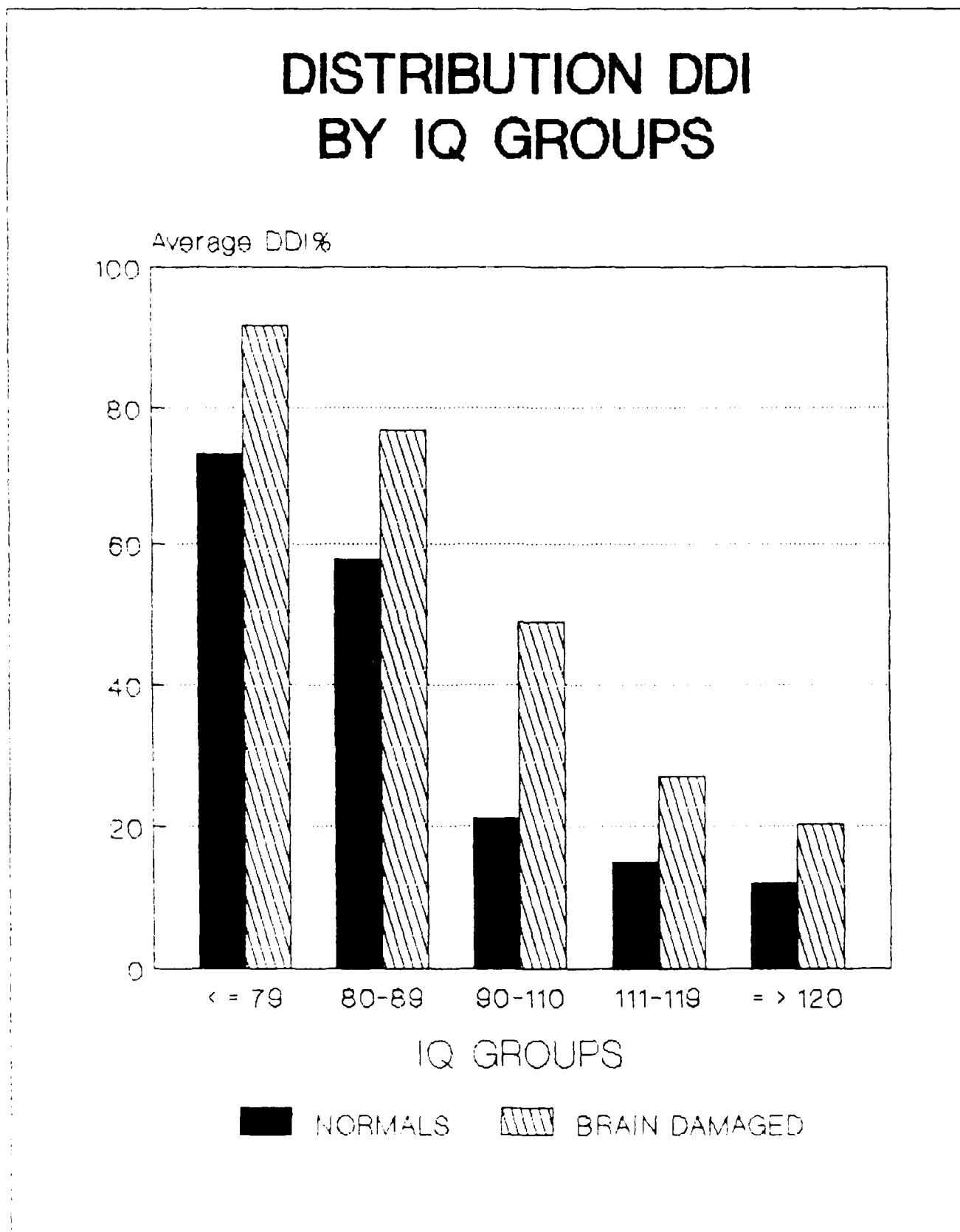


Figure 8. Dodrill Discrimination Index by IQ Groups



CURRENT STATUS AND FUTURE DIRECTIONS OF RESEARCH AND CLINICAL USE
OF THE HALSTEAD-REITAN NEUROPSYCHOLOGICAL TEST BATTERY

Ralph M. Reitan, Ph.D.

This lecture was divided into five major sections: (1) A brief description of the content, theoretical basis, and methodological considerations of the Halstead-Reitan Battery (HRB), (2) An illustration of a clinical evaluation of a patient, noting his strengths and weaknesses, and citing the areas that needed rehabilitation, (3) A description of the Neuropsychological Deficit Scale, a new method for evaluating and summarizing the test results of the HRB, (4) A review of recent research results, using the Neuropsychological Deficit Scale, to evaluate spontaneous recovery following traumatic brain damage with successive testings over an 18-month period, and (5) A review of principles and procedures involved in facilitated recovery of neuropsychological functions (brain retraining), and illustrations of the importance of evaluating an individual's neuropsychological strengths as well as weaknesses prior to developing a specific plan for cognitive retraining.

I. Brief Description of the Content, Theory,
and Methodology of the Halstead-Reitan Battery

It is well recognized that certain abilities largely reflect environmental influences and other abilities are much more closely dependent upon the immediate biological condition of the brain. A neuropsychological test battery should reflect the biological aspects of brain functions; however, the problem of discerning the basic and critical aspects of the behavioral correlates of brain functions has been a difficult and persisting problem (Reitan, 1966).

What functions should be measured and what tests should be given in order to evaluate brain-behavior relationships? In the past this question has been answered largely on a permissive and impressionistic basis, with one investigator after another devising a test to measure the "essential" behavioral correlate of brain functions. Lashley, for example, implicitly presumed that maze running ability represented the essential behavioral manifestation of brain functions in rats. Halstead (1947) was the first to recognize that the brain obviously subserves many different abilities and that a different approach was necessary. Halstead, using tests that could be administered in a standardized manner, began a systematic search to reveal a variety of brain-related abilities. Reitan continued this research, adding additional tests as necessary and organizing the

tests so that interindividual and intraindividual differences could be used as a basis for interpretation.

In addition, it was necessary to identify tests that were of general significance for cerebral cortical functions, tests that represented regional-localization aspects of brain functioning, and tests that reflected even more specific aspects of localization. In brief, development of a neuropsychological test battery required exploration of many areas of function with measurements organized according to methodological procedures which permitted identification of the uniqueness of brain-behavior relationships for the individual subject. Obviously, this was a complex task that required many years of investigation.

Besides formal methods of research centered around group comparisons of central tendency and variability (often in the framework of multivariate statistical analyses), a second approach was consistently used to focus the interpretation of test results on the individual. This method required independent evaluation of the individual patient with neuropsychological examination as well as simultaneous complete neurological, neurosurgical, and neuropathological studies. In order to determine the relevance of an individual's neuropsychological data to his/her neurological findings, a prediction of each subject's neurological status was made from the

neuropsychological results alone. This procedure, applied in thousands of individual cases, finally resulted in the development of a set of tests which consistently revealed cognitive impairment when neurological findings were positive and permitted development of tests that had complementary significance (as contrasted with tests that measure only a successive series of functions). This battery of tests has come to be known as the Halstead-Reitan Neuropsychological Test Battery.

II. Illustration of Clinical Evaluation

The second phase of this presentation included a demonstration of clinical interpretation of the results of the Halstead-Reitan Battery for two cases of traumatic brain injury. The first subject had a relatively focal lesion (left parietal depressed skull fracture and underlying epidural hematoma). The second patient had suffered diffuse involvement of the brain from a severe closed head injury.

The test results were considered for each case in the following manner: (1) The most sensitive general indicators of cerebral damage or dysfunction were reviewed, (2) The lateralizing results were considered, (3) The indications of deficits on neuropsychological tests were compared to the evidence of previously acquired intellectual and cognitive

abilities, (4) Tests that reflect the more stable status of a brain that has recovered in time were contrasted with the indications of remaining disruption of neuropsychological functions, (5) The subject's neuropsychological strengths as well as weaknesses were evaluated in order to obtain a composite picture of the individual's brain-behavior relationships (an approach that can be used only when using a standard battery that reflects all areas of brain functions, including the strengths as well as weaknesses), and (6) The information from the various approaches mentioned above were integrated to describe the uniqueness of the individual subject in terms of his/her brain-behavior relationships.

Obviously, the detailed considerations that are required for this type of analysis cannot be explained fully in this summary, but in this lecture the full set of test results were presented and explained for each subject. The important point to be emphasized is that the Halstead-Reitan Battery provides a comprehensive neuropsychological evaluation. Extensive training material has recently been published for those neuropsychologists who wish to improve their skills in this area (Reitan & Wolfson, 1985; Reitan & Wolfson, 1986).

III. The Neuropsychological Deficit Scale

The next step in the presentation was to describe the

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Neuropsychological Deficit Scale (NDS) and the extensive research which establishes its validity (Reitan & Wolfson, in press). The NDS is based upon transformation of every score generated in the Halstead-Reitan Battery for Adults (including level of performance measures, the occurrence of specific signs or deficits, comparisons of patterns of test results, and evaluation of differences in performance on the two sides of the body).

A total of 42 variables contribute to the NDS, yielding a single score which reflects the overall functional adequacy of the brain's neuropsychological manifestations. Detailed research has been performed with this new instrument and it appears to be considerably more sensitive than prior summary variables (such as Halstead's Impairment Index). Although patients with more serious and extensive involvement of the brain have worse NDS scores, the score for groups with lateralized lesions is equivalent, demonstrating that the NDS (as expected in terms of development of the Battery) shows equal respect for the two sides of the brain. Because computation of the NDS transforms raw scores into scores of clinical significance, test-retest comparisons done 12 months apart on normal subjects have shown that the effects of practice are diminished. Thus, the NDS promises to be useful for repeated evaluation and should assist in determining spontaneous or facilitated recovery as well as cognitive deterioration.

IV. Spontaneous Neuropsychological Recovery

Following Traumatic Brain Injury

This section of the lecture presented research results on subjects who had sustained traumatic brain injury and were tested initially (usually within 30 days following the injury), 12 months post-injury, and 18 months post-injury. This is one of the few studies that has been conducted to evaluate spontaneous recovery of neuropsychological functions following traumatic brain injury (Reitan & Wolfson, in press). The results indicate that improvement occurs in nearly every subject, but the absolute degree of improvement is greater for those persons who were more severely injured initially. In other words, the absolute degree of improvement relates to the absolute degree of initial impairment. However, those subjects with more severe initial impairment never reach the functional level (at least within 18 months) of those subjects who were initially less impaired.

A second major finding was that for individual subjects the greatest degree of improvement occurred in the areas of initial deficit. This is perhaps only to be expected, inasmuch as one would hardly expect trauma to the brain to have a positive influence on the cognitive abilities not initially impaired by the injury. However, this observation of the pattern of improvement in spontaneous recovery has definite significance concerning the approaches to be used in facilitated recovery

(brain retraining). If the natural course of recovery focuses on the areas of initial impairment, it would seem reasonable to simulate this process when deliberately retraining an individual's brain (as contrasted with other approaches that have been suggested in the literature).

The most important finding of this longitudinal research on spontaneous recovery from head injury concerns the comparison of test results obtained 12 months and 18 months after the initial examination. In the past, spontaneous recovery has been considered to be a gradually ongoing process even though it has been well recognized that the rate of recovery decreases with time. However, analysis of our results indicated that a number of subjects showed decrement of performances between 12 months and 18 months, with the decrement represented principally in the areas of initial impairment (the areas in which the subjects had shown their principal degree of recovery between the initial examination and the 12-month examination).

Further investigation indicated that the subjects who showed this decrement during the 12th-month to the 18th-month interval were those who had sustained actual cerebral tissue damage from the head injury (as contrasted with those subjects who had no neurological evidence of specific tissue damage but were classified as having suffered cerebral concussion). Both of these groups demonstrated significant improvement during the

period between the initial examination and the 12-month examination, but the group with neurological evidence of actual tissue damage from the head injury showed a statistically significant mild decrement on the Neuropsychological Deficit Scale between the 12-month examination and the 18-month examination.

These results appear to have significance that spreads over a number of areas, ranging from the need for an explanation of the pathological changes that must be assumed to underlie the long-term decrement to the implications for brain retraining and the need to counter the expected tendency toward long-term deterioration of previously recovered abilities through neuropsychological rehabilitation.

V. Facilitated Neuropsychological Recovery and Brain Retraining

In persons with cerebral lesions that reach a static and stabilized level in a biological sense, brain retraining represents a rapidly developing area in neuropsychology (Meier, Benton, & Diller, 1987) and probably will be of increasing significance in the future. In 1978 Reitan developed an extensive set of organized materials for retraining neuropsychological deficits in brain-injured persons. This training program is referred to as REHABIT (Reitan Evaluation of

Hemispheric Abilities and Brain Intensive Training) (Reitan & Wolfson, in press).

The training materials included in REHABIT are organized into five tracks according to content and the items in each track extend from very simple to quite complex tasks. The organization of REHABIT also reflects the model of brain-behavior relationships on which the Halstead-Reitan Battery is based (Reitan & Wolfson, 1985). The training items in Track A represent specific verbal and related symbolic material as well as expressive and receptive aspects of language use, including academic subject matter (left cerebral hemisphere). Items in Track E deal with tasks of a strict visual-spatial and temporal-sequential nature (right cerebral hemisphere).

Intermediately placed tracks emphasize the fundamentally important areas of abstraction, reasoning, logical analysis, and concept formation. Track B deals with these higher-level aspects of neuropsychological functioning using verbal, language, and related symbolic content. Track C, the middle track, is integrative and relatively neutral in terms of content but emphasizes abstraction and reasoning from a simple to complex level. Track D emphasizes these higher-level functions utilizing tasks that include visual-spatial content, sequential organization, and manipulatory skills. (See Reitan & Wolfson, in press, for a complete description of REHABIT.)

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The final aspect of this lecture included a demonstration of items selected from REHABIT and a discussion of their value and use in brain retraining. The advantages of REHABIT relate to two factors: (1) A careful review of thousands of possible items with a selection of those that appear genuinely valuable in terms of the kinds of deficits shown by persons with brain damage, and (2) The organizational relationship of the materials in REHABIT to the model of brain functions represented by the Halstead-Reitan Battery, which permits a direct transition from the deficits measured by the Battery to the brain retraining program.

The lecture concluded with an illustration of the way in which the cognitive retraining program would be applied to the cases of traumatic brain injury that were previously presented. As noted, a careful evaluation of neuropsychological strengths and weaknesses is initially imperative and the program of facilitated recovery, using REHABIT, relates directly to the results obtained from the Halstead-Reitan Battery. REHABIT is presently being used in many parts of the country and preliminary results appear to be very promising (Finlayson, Alfano, & Sullivan, 1987; Reitan & Sena, 1983).

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13

Localization and Distribution of Function in the Brain

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INTRODUCTION

Throughout his research career, Karl Lashley remained puzzled by the relationship between brain, behavior, and experience. On one hand, his experiments showed the brain to be put together with exquisite anatomical precision, which was to some degree reflected in the separation by behavioral function of the several sensorimotor systems and even regional differences within the so-called association areas. On the other hand, results of other experiments and observations made it clear that engrams, memory traces, could not be localized and that perceptual images and motor patterns displayed constancies and equivalences for which it was difficult to conceive *any* permanent "wiring diagram." Lashley is best known for his continuing attention to these nonlocalizable aspects of brain function that he formalized in the laws of mass action and equipotentiality. But it should be remembered that these aspects were puzzling to Lashley in large part because he was so keenly aware of the anatomical precision of the connectivity that gave rise to nonlocal characteristics in function. Had the brain been shown to be essentially a randomly connected network (as was so often assumed by those then working in the field of artificial intelligence), the problem might not have loomed so insurmountable.

In this chapter I present data that fill out a theoretical frame that was proposed by Lashley as a possible resolution of the localization/nonlocalization puzzle. These data have accumulated during the quarter century that has intervened since his last paper. The data have been gathered without reference to the frame, and the frame itself was derived, not from brain-behavior studies, but from the

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PRIBRAM

problems posed by morphogenesis during embryological development: Structural theories based on the principle of chemical gradients and resonances that "tune" specific locations in cytoplasm as inductors for organelles have been influential in embryology since before the turn of the century (see, e.g., Jacques Loeb, 1907; and Paul Weiss, 1939). In 1906, Goldscheider suggested that the structures of perception and memory might be similarly constructed by resonances among wave fronts created by sensory inputs in brain, especially cortical, tissue. In 1942, Lashley adopted this view as an alternative both to Köhler's field theory and to a localizationist view in which one percept or engram is matched to one neuron or neuron assembly. Lashley was never satisfied with this adoption because he could not envision the specific mechanisms that would give rise to resonant (and interfering) wave fronts in brain tissue and, equally important, how these, in turn, might be responsible for the structures that comprise perception and engram. He nonetheless held to the view that neither field nor localization (as, e.g., in the sophisticated development of Hebb, 1949) could account for the complex relationship between brain anatomy and phenomenal experience or could deal adequately with the encoding of memory.

Today a resonance theory *can* be detailed with high precision. Such a theory is thoroughly grounded in the structures and functions of the microanatomical connectivity of the nervous system and provides a mathematically sophisticated formulation of the relationship between anatomy and the images of perception, and also between anatomy and memory structure. Further, instantiations of this mathematical formulation in hardware have made possible *in vitro* observations that allow the exploration of the range and limits of the formulation. Finally, *in vivo* experimentation has provided a wealth of neurophysiological data that can be used to test the theory against alternative formulations.

THE NEURAL MICROSTRUCTURE

A fundamental observation concerning the structure and function of the nervous system is the fact that the relationship between locations that characterize peripheral receptors and effectors is reflected in the organization of the input to and output from the brain cortex. The peripheral relationship may become distorted through convergence in the pathways to synaptic way stations that are intercalated between periphery and cortex and by divergence from those way stations, but enough of the relationship is maintained to be recognizable as a mapping of periphery onto cortex. In order for such cortical mapping to be possible, signals must be transmitted from and to specific locations in the periphery by way of pathways of nerve axon systems in which impulses are generated and propagated.

A second fundamental fact about the organization of the nervous system is

that these peripheral-cortical axonal pathways are interlaced at every station—that is, in the periphery (e.g., in the retina), in central nuclei (e.g., in the lateral geniculate nucleus), and at the cortex (e.g., in the striate cortex)—with cells that possess either very short, fine-fibered axons or no axons at all. Such cells, called “local circuit neurons” (Rakic, 1976), are incapable of maintaining and transmitting action potentials, the nerve impulses, that convey signals over distances. Instead, these local circuit neurons are characterized by profusely branching dendrites that intersect with others from adjacent neurons. The electrical potential changes in such dendritic structures tend to be graded rather than impulsive, and when impulses are generated they are small in amplitude, decay rapidly, and thus are not conducted over any considerable distance (Rall, 1970; Shepherd, 1974). In sum, the potential changes in these dendritic arborizations are most often hyperpolarizing and thus inhibitory (e.g., Benevento, Creutzfeldt, & Kuhnt, 1972; Creutzfeldt, Kuhnt, & Benevento, 1974).

The interaction between vertical (i.e., periphery to cortex) axonal transmission pathways and the interlaced horizontal dendritic networks has been worked out in several sensory systems by extracellular recordings made from the separate neurons composing the axonal transmission pathways. In essence, the interaction leads to a center-surround organization when a discrete stimulus excites the neuron. A center-surround organization is one in which the spatial extent of the signals transmitted becomes enveloped in a penumbra of signals of opposite sign. This center-surround organization often displays the characteristics of a waveform in that several excitatory and inhibitory bands surround the center much as ripples are formed in a pond when the surface is excited by a pebble. Precise mathematical descriptions of such center-surround organizations have been given by Bekey for the auditory and somatosensory systems (1959) and Hartline (1940) and by Rodieck and Stone (1965) for the visual system (see also the review of early formulations by Ratliff, 1961). The data obtained from the olfactory system appears somewhat more complicated (Shepherd, 1974), but mathematical treatment has been successfully achieved by Freeman (1975).

The results of these studies have in common the finding that whatever the nature of the inciting stimulus to receptor excitation, such excitation and its subsequent processing can be readily formulated in terms of a calculus describing the microstructure of a network of hyper- and depolarizations. This formulation shows that the principle of superposition applies to the local spatial interactions between excitation (depolarizations) and inhibition (hyperpolarizations). Superposition indicates that the system is linear within the ranges examined and that a waveform interpretation of the data is useful. This does not necessarily mean that the dendritic potentials actually make up discernible wave fronts; what it does mean, at the minimum, is that the center-surround data describe transfer functions by which a matrix of discrete polarizations is related to an exciting input, functions that can readily be treated by linear wave equations.

Holography

These mathematical treatments of the data obtained from recordings of potentials of single neurons in the nervous system are akin to those that spawned holography. In 1948 Dennis Gabor devised a mathematics showing that image reconstruction might attain greater resolution if, instead of intensity, the pattern of wave fronts generated on a photographic film by an exciting electron or photon were recorded. Gabor addressed his mathematics to electron microscopy, but in the early 1960s optical holography succeeded in implementing this image-processing technique in such a way that the properties of holograms became readily demonstrated (Leith & Upatnick, 1965). The essential properties are as follows: (1) The holographic store is distributed; (2) vast amounts of storage can be concentrated in a small holographic space; (3) image reconstruction is three-dimensional, displaying constancies and parallax, and is highly textured; (4) images do not appear coextensive with the holographic store; they are projected away from the film surface; (5) the hologram has associative properties; when it is made by the reflected light of two objects, subsequent illumination of the stored hologram by light reflected from only one object will reconstruct a ghost image of the missing object.

These properties of holograms are so similar to the elusive properties that Lashley sought in brain tissue to explain perceptual imaging and engram encodings that the holographic process must be seriously considered as an explanatory device. In doing this, however, it must constantly be remembered that it is the mathematics of holography and brain function that needs to be compared and tested, not the optical holograms or computer instantiations of holography.

The essentials of this mathematics can best be summarized by reference to a particular form of holography—the construction of a Fourier hologram. The Fourier theorem states that any pattern, no matter how complex, can be decomposed into a set of component, completely regular, sine waves. The Fourier transform of an image is formed by encoding these component waveforms. Thus, in the transformed record, each point indicates the presence of a particular component waveform rather than the corresponding local intensity, as in an ordinary record. Take for comparison an ordinary photograph and a Fourier-transformed record. The ordinary photograph is made up of a mosaic of points of varying intensities, the intensity of each point corresponding to the intensity of a point of light reflected from a specific location on the object being photographed. In the Fourier-transformed record, by contrast, each point represents the amount of energy present in a waveform component of the entire array of light reflected from the object. The bandwidth of that component may vary; the resolving power of the transform is in part dependent on this bandwidth.

To make a (Fourier) hologram, two such Fourier-transformed records must be linearly superposed. Mathematically, this is performed by the transfer function in which one record is convolved with the other and then the resultant complex

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conjugate stored. In essence, convolving consists of "adding" the waveforms together. Now each point in the record contains this "addition"—that is, the resultant of superposing the energy contained in two waveform components derived from the entire array of reflected light. A holographic record can be made by superposing the Fourier transform of the light reflected from two (or more) objects or by using the transform of a nonreflected reference. When two or more objects are used, the light reflected from each serves as a reference for the other(s). This accounts for the property of associative recall already noted. In addition, since parts of objects as well as whole objects serve as sources of reflection and thus as references for other parts, constancies are generated when images are (re)constructed. Constancies are therefore the result of the fact that the transformed "view" of any part of the objects acts as a reference for every other part.

It is these enfolding properties of holograms that make them so counterintuitive. Within the holographic domain, geometry as we sense it disappears and is replaced by an order in which the whole becomes enfolded and distributed into every part—thus the term *hologram*—but from each part, the whole can again be reconstituted. This is due to another property of the Fourier theorem: Applying the identical transform inverts the waveform domain back into the image! The process (the Fourier transfer function) that converts images into waveforms can therefore also accomplish the inverse and convert waveforms into images.

This parsimony in processing raises the question of utility. If image and waveform domain are so readily transformed into each other, why bother? The answer to this question is that correlations are much simpler to accomplish in the waveform domain; they essentially entail superposition, addition. That is why the Fast Fourier Transform (FFT) has proved so useful in computer programming—for instance, when image reconstruction by CAT scan in X-ray tomography is desired. It is this power of the Fourier domain that the brain can exploit.

In the introduction it was noted that there really have been only three classes of neural mechanisms proposed to explain the properties of perception. The three may, for convenience, be labeled: field theoretic, feature correspondent, and holographic. A review of currently available data regarding each of these classes follows:

DEFINITION AND EVIDENCE: FIELD THEORY

Wolfgang Köhler proposed that direct current (DC) fields were set up in the brain cortex by sensory stimulation and that these fields were isomorphic with—that is, had the same shape as—the phenomenally perceived stimulus. Köhler showed that, in fact, sensory stimulation did result in DC shifts (Köhler & Wegener, 1955), and in our laboratory we showed that such shifts were accompanied by

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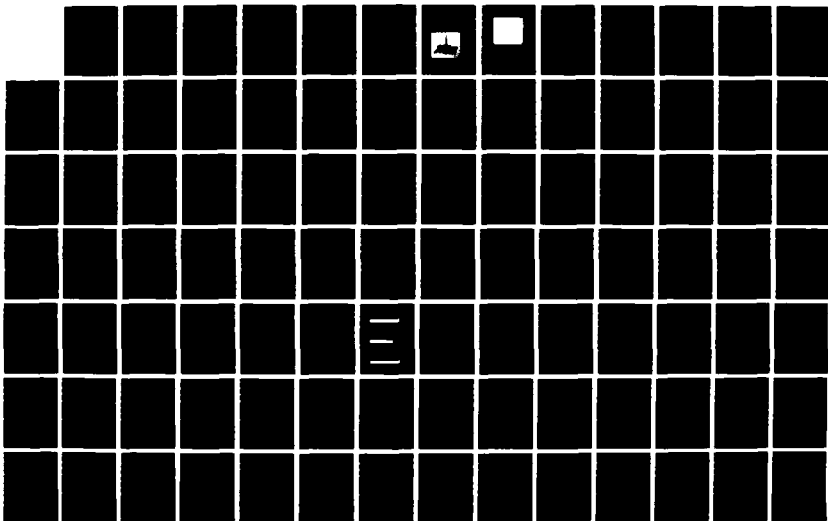
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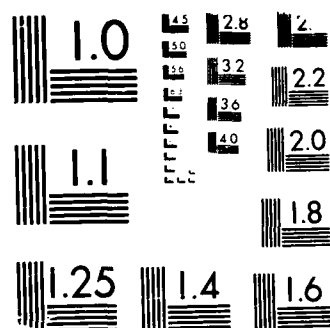
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desynchronization of the electrocorticogram (Gummit, 1960). However, several experiments that throw doubt on the relationship between such shifts and perceptual performance were performed by Lashley, Sperry, and Pribram. In these experiments gold foil was placed over the surface of the cortex (Lashley, Chow, & Semmes, 1951); the cortex crosshatched the mica insulating strips inserted (Sperry, Miner, & Myers, 1955); and aluminum hydroxide cream injected in minute amounts into the cortex to produce gross abnormalities (Kraft, Obrist, & Pribram, 1960; Pribram, 1951; Stamm & Knight, 1963; Stamm & Pribram, 1960, 1961). See Figs. 13.1 and 13.2.

In none of these experiments did the animals show any change in their ability to discriminate among cues; gross alteration of the cortical DC field was not accompanied by any gross change in perceptual performance. These findings take additional meaning from the fact that the aluminum hydroxide cream implantation produced a fivefold retardation of learning and that imposing direct currents across cortex impairs (when cathodal) and enhances (when anodal from surface to depth) learning (Stamm & Rosen, 1972). Direct current fields are thus shown capable of biasing learning rate; and at the same time such fields seem to be unrelated to the structuring of percepts.

DEFINITION AND EVIDENCE: FEATURE CORRESPONDENCE THEORY

Field theory and feature correspondence concepts either explicitly or implicitly imply a brain-perceptual isomorphism. In the case of feature correspondence, isomorphism is thought to be established when a particular cell or cell assembly responds uniquely to a feature of the phenomenally experienced image; that is, a

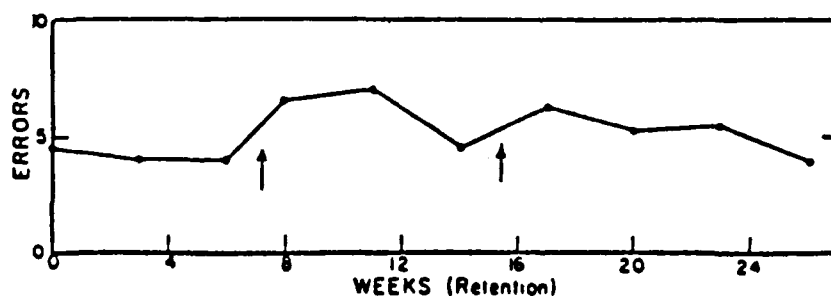


FIG. 13.1. Record of retention of a visual discrimination performance (+ vs. □) before and after implantation of aluminum hydroxide cream (first arrow) in primary visual cortex and the subsequent development of electrical seizure patterns (second arrow). Note that no deficit has occurred. The same result was obtained when the implantations were performed in inferotemporal, parietal, and frontal cortex.

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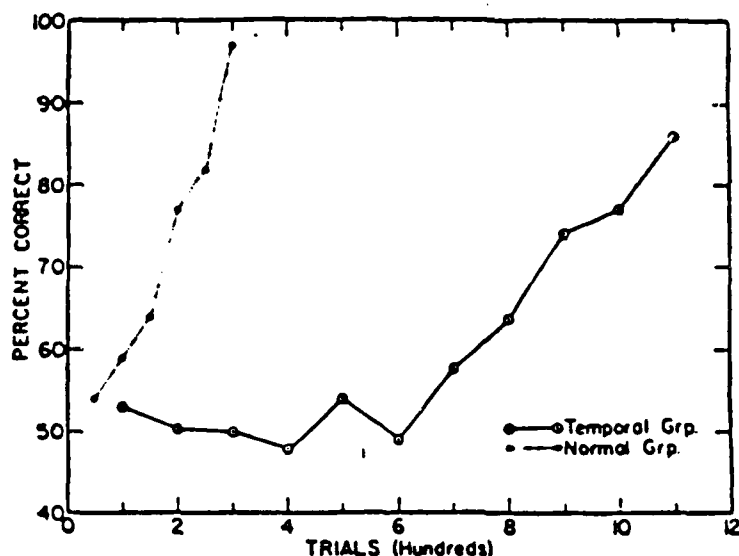


FIG. 13.2. Record of *learning* the same visual discrimination *after* the development of electrical seizure patterns. Note the prolongation of the "period of stationarity"—the flat part of the learning curve prior to its rise.

feature of the imaged object is detected. It is then assumed that the organism's response to the total object is composed by convergence of the outputs from a set of feature selective elements onto a higher-level neuroperceptual unit—a "pontifical" cell or cell assembly (Hebb, 1949) composed of like elements ("cardinal" cells; Barlow, 1972).

In the late 1950s and early 1960s, Hubel and Wiesel (e.g., 1962) discovered that the center-surround organization of the dendritic microstructure of cells (their receptive fields) in the peripheral visual system became elongated at the cortex. Further, they presented indirect evidence that this elongation might be due to convergence onto the cortical cells of fibers from cells with center-surround receptive fields. Their demonstration emphasized that cells in the visual cortex responded best to bars of light presented in specific orientations. It was easy to generalize these findings into a Euclidean geometry of brain function—points to oriented lines, to curves and planes, to complex figures of all sorts. The search for feature detectors was on.

The results of the search were by no means meager. For instance, one cell in monkey cortex was found to respond maximally to a monkey's hand (Gross, Bender, & Rocha-Miranda, 1969); another cell was shown to respond best when a stimulus was repeated six times (Groves & Thompson, 1970); still others appeared to be activated largely by vocalizations of their own species (Maurus & Ploog, 1971).

Such specific selectivities can be misleading, however, if they are interpreted as showing that the cells in question function as feature detectors. To serve as a detector, the output of the cell must uniquely reflect the input feature, and this is only occasionally the case. More often a cell responds to a variety of feature triggers. In the visual system, for example, a cell that responds selectively to a bar in a specific orientation will modify that response with a change in luminance, with the direction of movement of that bar and the velocity of such movement (Pribram, Lassonde, & Puto, 1981; Spinelli, Pribram, & Bridgeman, 1970). Furthermore, that very same cell may show a differential response to color and even be tuned to a specific auditory frequency (Spinelli, Starr, & Barrett, 1968). Finally, the number of bars, their widths, and spacings also influence the response of the cell, which suggests that "stripes" rather than "bars" form the critical stimulus dimension for their orientation selectivity (DeValois, Albrecht, & Thorell, 1978; Glezer, Ivanoff, & Tscherbach, 1973; Movshon, Thompson, & Tolhurst, 1978; Pollen & Taylor, 1974; Schiller, Finlay, & Volman, 1976). More of this in a moment.

Findings such as these, and they are equally true of other systems (e.g., see Evans, 1966, for cells in the auditory cortex), make untenable the view that these cortical cells are simple detectors of features. Nonetheless, each cell is selectively responsive to a variety of highly specific stimulus dimensions, the "feature triggers." Some of these dimensions appear to be mapped into recognizable patterns in adjacent cells; for example, orientation selectivity has been related to the columnar structure of cortex (Hubel & Wiesel, 1977), and selectivity to bar width and spacing has been reported to be a function of cortical layers (Maffei & Fiorentini, 1973). Other stimulus dimensions, such as the tuning of cells in the visual cortex to auditory frequencies, are distributed without any apparent regularity over much wider expanses of cortex. These distributed forms of organization become especially evident when recordings are made from groups of neurons when problem solving is being investigated (Gross, Bender, & Gerstein, 1979; John, Bartlett, Shimokochi, & Kleinman, 1973; Pribram, Spinelli, & Kamback, 1967).

The view obtained from the results of these studies is that rather than feature detection by single neurons, some sort of feature selection is effected by neuron networks. Some features seem to relate a structured network response; these same features and others may, however, under other conditions, elicit a more widely dispersed response. Furthermore, features are not always what they initially seem to be, and little attempt has yet been made to classify features systematically in such a way as to relate their phenomenal to their neural response characteristics. An exception to this has been the experiments of DeValois on the color system of primates, which can serve as a model for studies of feature analysis by neural networks (DeValois, 1960).

Feature selection by neural networks may be considered a form of feature correspondence. As noted in the previous paragraphs, however, the nature of the

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features responded to by a neural network property is often considerably different from their perceived phenomenal nature. Perception is only under very restricted circumstances limited to bars of certain width and spacings, or to a limited range of tonal frequency. With the exceptions of color and species-specific vocalizations, the phenomenal-neural correspondence seems at best strained in view of the multiple selectivities of most cells and the fact that these multiple selectivities fail, for the most part, in any cell or cell assembly to map coherently phenomenally experienced psychophysical characteristics. In the case of color and that of species-specific vocalizations, however, such mappings show that feature correspondence can be abstracted from the multiple selectivities of neurons and neuron assemblies. The question of how this abstraction is accomplished remains.

DEFINITION AND EVIDENCE: HOLOGRAPHIC THEORY

One possibility for abstraction lies in the powerful correlational facility of holographic transformations. The idea that the neural network performs holographic transformations on sensory input must be clearly distinguished from both field theory and feature correspondence theory. In a holographic transformation, the various stimulus dimensions become enfolded into every part of the transform domain; a set of neural signals is transformed, and transfer functions, often readily dealt with by waveform mathematics, describe the transformation. However, statistical mathematical procedures have proved equally useful, and a combination of waveform and statistical approaches has been found to be most powerful (e.g., see Julesz, 1971, for the visual system; Flanagan, 1972, for the auditory system). Transformation of a set of signals into an enfolded order is very different from simply generating a DC field in cortex by the arrival of neural signals. Holographic theory is therefore not a field theory, although it is related to field theory in that wave mechanical descriptions are relevant and holistic, rather than point-to-point, analysis is emphasized.

Holographic transformations also resemble feature correspondence theory to some extent, although once again they can be sharply distinguished. The similarity comes from the fact that, as already noted, performing a transform a second time will reinstate the image (with all its features) from the transform domain. The difference between holographic transformation and feature correspondence is that the transform domain is recognized and, in the strongest form of the theory, is recognized as *the* domain in which neural networks operate. The finding of multiple feature selectivities of most brain cells and cell assemblies is compatible with such a view. As we shall see, however, this strongest form of the theory does not account for all the available data, thus necessitating some specifiable modifications. In either the strongest or modified version, *features are generated, constructed, when the encoded transform domain is addressed*

through additional sensory input or by "reference" from other neural processes such as sensitivities to internally produced stimulation.

There is thus no brain-perceptual isomorphism in the holographic theory as there is in the field and the feature correspondence theories. Rather, phenomenal experience is generated when sensory or internally derived inputs activate a holographic process or store. There is therefore no necessary identity between brain structure and phenomenal experience, just as in an optical hologram there is no identity between the structure of the photographic film and the image produced when that film is properly illuminated. Even a functional identity between phenomenal experience and brain processes becomes suspect if this means ignoring the input to senses from the world outside the organism and the input to other receptors from within the body.

What, then, are the transfer functions that describe the transformations of sensory and bodily inputs into a brain holographic process? And what are the limits of explanatory power of such transfer functions with respect to the data at hand? The first suggestion that brain processing might involve a Fourier analysis was made a century ago for the auditory system by Ohm, the same Ohm who formulated Ohm's law of electricity. This suggestion was adopted by Herman von Helmholtz, who performed a series of experiments that led to the place theory of hearing—essentially a view of the cochlea as a piano keyboard whose keys, when struck by acoustic waves, would initiate nerve impulses to the brain, where resonant neurons were activated. This view was modified in this century by Georg v. Békésy (1959), whose experiments showed the cochlea and peripheral neurosensory mechanism to operate more like a stringed instrument, sensitive to superposition of acoustic waveforms. Good evidence has accrued to the effect that a major effect of initial auditory processing can be described in terms of a Fourier transform of the acoustic input (Evans, 1974).

Békésy (1959) then went on to make a large-scale model of the cochlea composed of a set of five vibrators arranged in a row. The model could be placed on the forearm and the phase of the vibrators adjusted. At particular adjustments the phenomenal perception produced by the model was that of a point source of stimulation. When two such model "cochleas" were properly adjusted and applied, one to each forearm, the point source appeared, at first, to jump alternately from one forearm to the other, then suddenly to stabilize in the space just forward and between the two arms. In short, the stimulus was "projected" away from the stimulating source and receptive surface into the external world.

Both macro- and microelectrode studies have shown that multiple vibratory stimulations of the skin also evoke unitary responses in cortex (Dewson, 1964; Lynch, 1971). The electrical potentials evoked fail, therefore, to reflect the actual physical dimensions of the stimulus. Instead, they reflect the fact that the sensory process has transformed the physical stimulus according to some transfer functions. Békésy noted that sensory inhibition, effected by lateral inhibitory dendritic networks of neurons, might be the responsible agent in the transformations.

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Evidence is therefore at hand to indicate that the input to the ear and skin becomes transformed into neural patterns that can be described by sets of convolutional integrals of the type that Gabor (1969) has suggested as stages in achieving a fully developed Fourier holographic process. In the olfactory (Freeman, 1975) and visual systems, as well, such transformations have been described by Rodieck (1965) as convolving input with retinal receptive field properties as recorded from units in the optic nerve. See Figures 13-3a and 13-3b.

The manner in which such a stepwise process occurs is best worked out for the visual system. A second step in the process occurs at the lateral geniculate nucleus, where each geniculate cell acts as a peephole, "viewing" a part of the retinal mosaic. This is due to the fact that each geniculate cell has converging

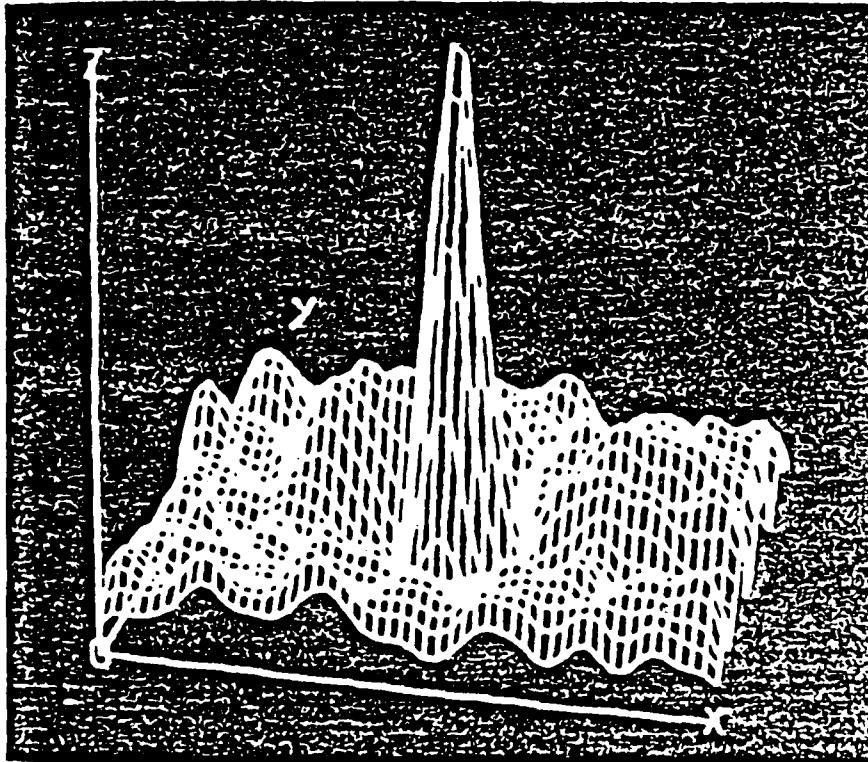


FIG. 13.3a. Three-dimensional computer-generated reconstruction of the receptive field of a neuron in the lateral geniculate nucleus. Note the "Mexican hat" configuration where the height of the crown (z axis) reflects the number of impulses generated by the cell in response to a moving light displayed over the reach of the x - y plane represented as the brim of the hat. A similar, though not as completely regular, receptive field configuration is found when cells in the optic nerve are plotted.

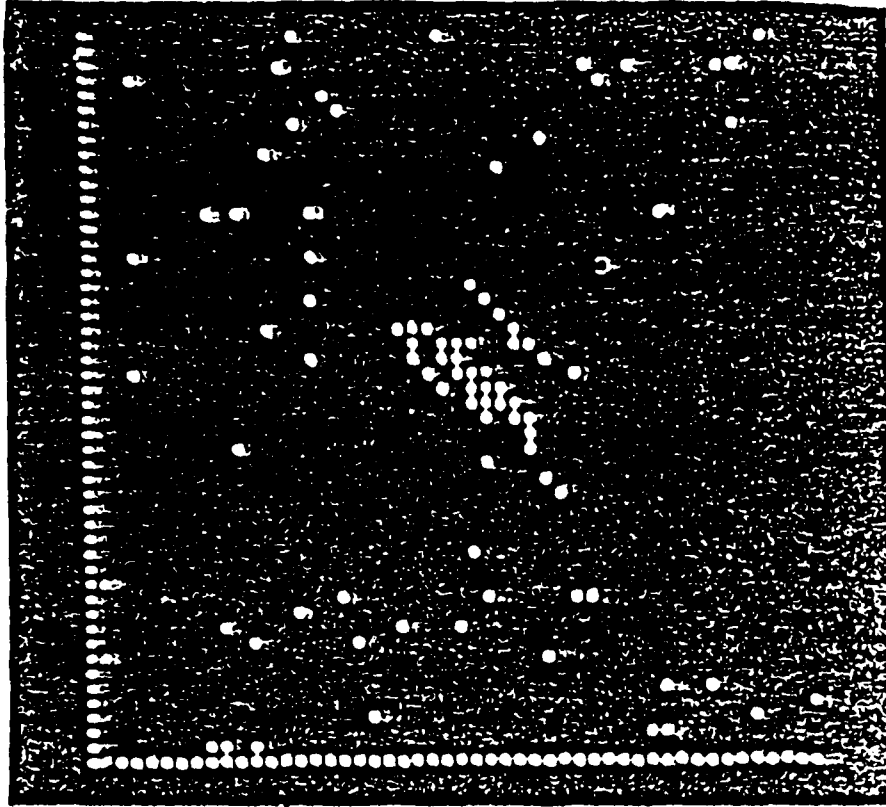


FIG. 13.3b. Cross section of a receptive field of a cell in the visual cortex. Now the three-dimensional reconstruction would resemble a bomburg rather than a Mexican hat because the receptive field has become elongated. Note the sidebands (inhibitory and excitatory) which suggest that the cell's best response might not be produced by a single line but rather by multiple lines (gratings). Note also the orientation selectivity of the receptive field which is a consequence of its elongation.

upon it some 10,000 optic nerve fibers originating in the ganglion cells of the retina. The receptive field of the geniculate neuron is composed of a center surrounded by concentric rings, each consecutive ring of sharply diminishing intensity and of sign opposite that of its neighbors (Hammond, 1972). This type of organization is characteristic of units composing a near-field Fresnel hologram (Pribram, Nuwer, & Baron, 1974).

At the cortex the transformation into the Fourier domain becomes complete. Beginning with the work of Campbell and Robson (1968); Pollen, Lee, and Taylor (1971); Maffei and Fiorentini (1973); and Glezer, Ivanoff, and Tschers-

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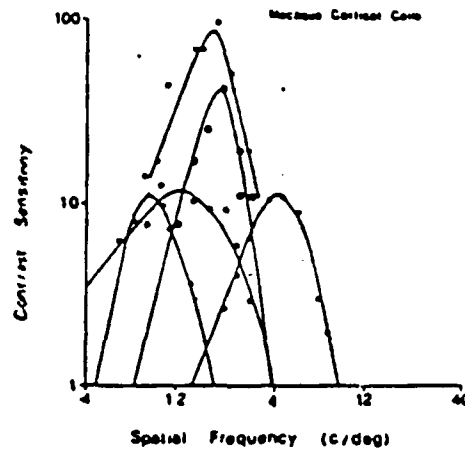


FIG. 13.4. Graph of tuning curves of five individual adjacent neurons in the visual cortex of a rhesus macaque monkey exposed to a range of gratings of various spatial frequencies (widths and spacings). These tuning curves were obtained at threshold (when the grating contrast was just sufficient to elicit a constant response). Results such as these are interpreted to indicate that the visual system performs a spectral analysis on the patterns of light and dark distributed across space that make up the visual scene. In a very basic sense, therefore, the visual system can be said to operate somewhat like the auditory and somatosensory systems where spectral analyses of sound patterns and vibratory patterns are performed. (From "Cortical Cells: Bar and Edge Detectors, or Spatial Frequency Filters?" by R. L. De Valois, D. G. Albrecht, & L. G. Thorell. In S. J. Cool & E. L. Smith (Eds.), *Frontiers in Visual Science*. New York: Springer-Verlag, 1978, p. 548.)

bach (1973), investigators using gratings as stimuli (e.g., Pribram et al., 1981; Schiller et al., 1976) have repeatedly confirmed that the cells in visual cortex are selectively tuned to a limited bandwidth of spatial frequency of approximately an octave ($\frac{1}{2}$ to $1\frac{1}{2}$ octaves). The spatial frequency (or wave number) of a grating reflects the widths and spacings of the bars making up the grating. When such widths and spacings are narrow, the spatial frequency is high; when widths and spacings are broad, the spatial frequency is low. See Fig. 4. Ordinarily the term *frequency* implies a temporal dimension; in the case of spatial frequency, this temporal dimension can be evoked by successively scanning across the grating (e.g., by walking across the path of illumination of a projection of a slide of such a grating). Conversion to the temporal dimension is, however, not necessary. The grating is a filter whose characteristics can be expressed either as spatial or temporal or both.

The difference between a feature correspondence and a holographic transform approach has recently been brought into sharp focus by tests of hypotheses devised to contrast the two. In the visual cortex the center-surround organization

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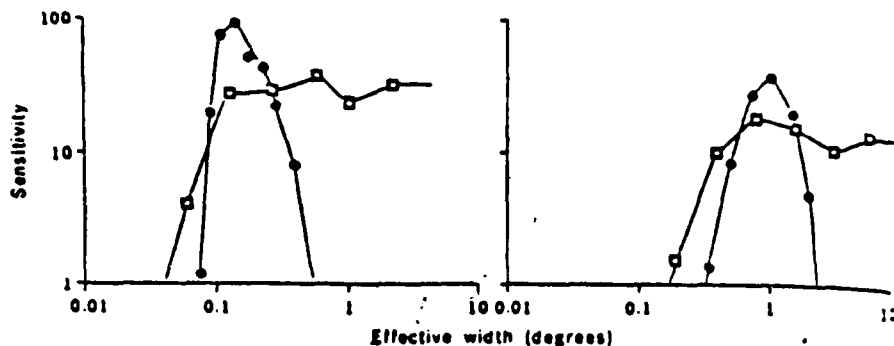


FIG. 13.5. Selectivity functions for bars (squares) and gratings (circles) of two striate neurons: (Left) macaque monkey simple cell; (Right) cat complex cell. There is little selectivity for bars and essentially no drop in the sensitivity as bar width increases. In contrast, the cells are sensitive to only a limited range of spatial frequencies and are therefore selective for gratings. (From "Visual Cortical Neurons: Are Bars or Gratings the Optimal Stimuli?" by D. G. Albrecht, R. L. De Valois, & L. G. Thorell. *Science*, 1980, 207, 88.)

of visual receptive fields that obtains in the geniculate nucleus gives way to an elongated receptive field with sidebands of opposite sign. In their original discovery of this change, Hubel and Wiesel (1959) emphasized that lines presented at specific orientations were the most effective stimuli to activate units with such receptive fields. They also presented evidence that the elongated fields might be composed by convergence from geniculate cells with spotlike concentric fields. The feature hierarchy Euclidean view of feature correspondence grew naturally from these early results and their interpretation. More recently it has been shown, as noted earlier, that these cells with orientation-selective, elongated receptive fields also vary their output with changes in luminance, movement of lines across the receptive field, the direction of that movement, its velocity, and the number and spacings of such lines (gratings of various spatial frequencies). In addition, it has been shown that changes in the width of single lines have little effect on the responses of these cells (DeValois et al., 1978; Henry & Bishop, 1971). See Fig. 5. Finally, in a direct confrontation of feature correspondence theory, DeValois, DeValois, and Yund (1979) showed that the complex stimulus such as a plaid or checkerboard had to be rotated in such a way that the axes of the Fourier transform, rather than the edges per se of the stimulus pattern, would engage the orientation selectivity of the cell. Every cell examined responded maximally when the plaid or checkerboard pattern was rotated to the degree and minute of visual angle predicted by the Fourier (and no other) transform of the pattern as determined by computer (using the Fast Fourier Transform—FFT). See Fig. 6. the cortical cells were thus shown to respond holistically (i.e., to the Fourier transform of the entire pattern) rather than feature by feature. In another elegant

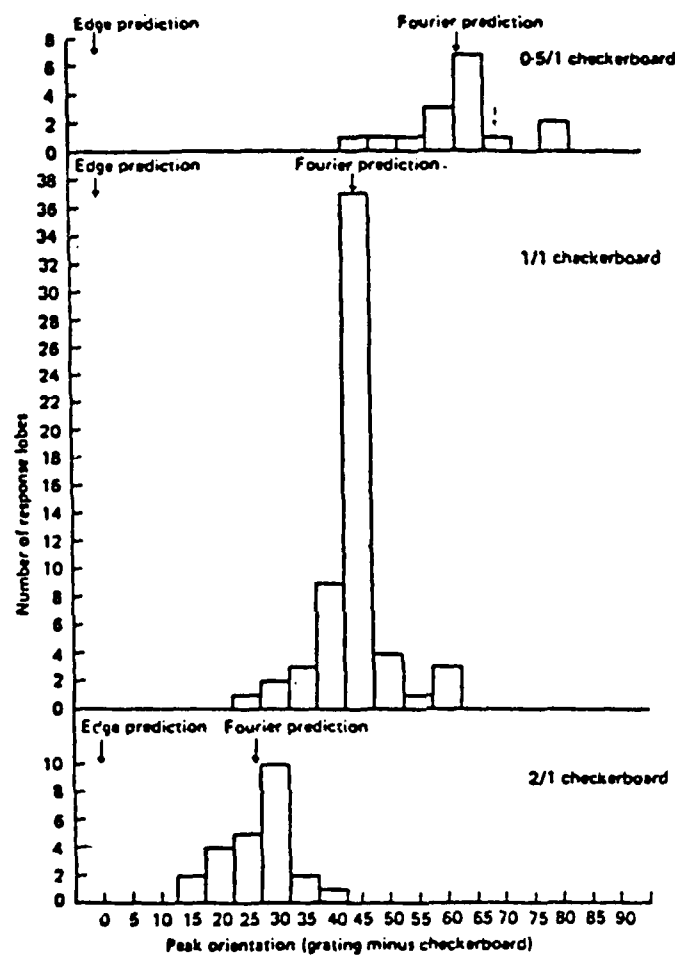


FIG. 13.6. Histograms of the differences between optimum orientations for gratings and for the various checkerboards. Our entire cell sample from cat and monkey is included. The arrows indicate the difference predicted on the basis of the orientation of the edges of the checks in the patterns (edge prediction) and the difference predicted on the basis of the orientations of the patterns' fundamental Fourier components (Fourier prediction). The mean orientation shifts, compared with the Fourier prediction, for each of these patterns are as follows: 2/1 checkerboard 26.9° (Fourier prediction 26.6°); 1/1 checkerboard 44.3° (predicted 45°); 0.5/1 checkerboard 63.9° (predicted 63.4°). (From "Responses of Striate Cortex Cells to Grating and Checkerboard Patterns" by K. K. De Valois, R. L. De Valois, & E. W. Yund, 1979.)

experiment, Movshon et al. (1978) has detailed the complementarity between the spatial profile of the receptive fields of these cells and the Fourier transform of the stimulus giving rise to that profile. That cells in the visual cortex encode in the Fourier domain is thus an established fact.

These findings do not, however, mean that the visual system performs a global Fourier transform on the input to the retina (see also Julesz & Caelli, 1979). The moving retina decomposes the image produced by the lens of the eye into a "Mexican hat" receptive field organization that can be described as convolving retinal organization with sensory input (Rodieck, 1965). But the spread function, as such convolutions are called, does not encompass the entire retina; rather, it is limited to the receptive field of a retinal ganglion cell. Similarly at the cortex, full-fledged encoding in the Fourier domain is restricted to the receptive field of the cortical neuron. This patchy organization of the Fourier domain (Robson, 1975) does not impair its holographic characteristics. The technique of patching or stripping together Fourier-transformed images has been utilized in radio astronomy by Bracewell (1965) to cover expanses that cannot be viewed with any single telescopic exposure. The technique has been further developed by Ross (see Leith, 1976) into a multiplex hologram to produce three-dimensional *moving* images when the inverse transform is effected. Movement is produced when the Fourier-encoded strips capture slightly different images—for instance, when adjacent frames of a motion picture are used as the image base for the Fourier transformation.

In the multiplex hologram, spatial relationships among the Fourier-transformed patches or strips become important. Thus, this form of hologram is a hybrid from which movement can be derived. Recall that a simple hologram is characterized by *translational invariance*; that is, the image that results from inversion is essentially stationary and appears the same from different vantages except for changes in perspective (object constancy). The hybrid multiplex form has therefore considerable advantage for moving organisms.

Suggestions have been made that the orientation-selective, elongated receptive fields that compose the visual cortex are arranged in Fibonacci spirals along the axes of cortical columns (Schwartz, 1977). Such an arrangement of the spatial relationships among the Fourier-transformed patches of receptive field would enhance still further the power of the transform domain in that three-dimensional movement (and therefore the resultant space-time relationship) would be readily explained. At present evidence for this sort of helical arrangement is not firmly established; on the other hand, the suggestion is consonant with what is already known.

Perhaps more important is the well-established fact that there is a topographic correspondence between receptor surface and its cortical representation in cortical columns (Edelman & Mountcastle, 1978; Hubel & Wiesel, 1977). Thus, the holographic patches have an overall arrangement that corresponds to the sensory surface of the organism. Therefore in coarse grain (i.e., between receptive

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fields), the sensory mechanism is represented; in fine grain (i.e., within receptive fields), a holographic representation becomes manifest. The situation is not altogether different from that in physics. At a certain grain of analysis—the ordinary—the principles of mechanics operate. At a finer grain (where electrons and photons come into focus) quantum principles come into operation with their complementarities, such as between locus and moment and between wave and particle.

David Bohm (1971, 1973) has pointed out that we can begin to conceptualize these complementarities in quantum physics if we realize that concepts about particles devolve from the use of lenses. Lenses built into the objectives of our telescopes (to deal with photons) and microscopes (to deal with photons and electrons) objectify by *focusing* electromagnetic energy. The result is that we experience objects, particles, things. If, on the other hand, we should peer at the universe through gratings of various spatial frequencies, Bohm suggests, we would experience a holographlike universe of interfering waveforms (which, in physics, is what results in double-slit experiments and the like).

Take this formulation and apply it to the brain. The ordinary coarse-grained representation of receptor surfaces provides a lenslike mechanism for processing input. With this mechanism we can "make sense" of the universe in terms of images of objects because we sense it through lenses and lenslike structures (the cochlea, the skin, as in Bekesy's experiments). But at the same time, a finer-grained—quantum level—process operates to provide a different sort of order, a holographlike, distributed, and enfolded order superior in correlating and in storing and in computing. Is this order best described in wave or in statistical terms or both? The Fourier approach has been extremely successful; but are we in the brain sciences about where physics was when Schrödinger proposed his encompassing wave equation?

COUNTERPOINT

The multiplex hybrid nature of cortical holographic organization serves as a warning that any simply conceived "global-Fourier-transform-of-input-into-cortical-organization" is untenable. Furthermore, the multiple selectivities of cortical cells in the visual (Morrell, 1972; Spinelli, Pribram, & Bridgeman, 1970; Spinelli, Starr, & Barrett, 1968), auditory (e.g., Evans, 1974), and somatosensorimotor (e.g., Bach-y-Rita, 1972) projection areas clearly indicate that such cells serve as nodes in neural networks in which the Fourier transform is only one, albeit an important, process. Several attempts have been made therefore to characterize more fully such cortical networks in terms of their essential properties. Thus, Longuet-Higgins (see Willshaw, Buneman, & Longuet-Higgins, 1969) proposed an associative-net model, and Leon Cooper (1973) has developed this model into a self-organizing distributed net whose mathematical

description contains as a special case the Fourier transform hologram. Julesz (1971), Uttal (1978), Borsellino and Poggio (1973), Poggio and Torre (in press), and (in our laboratories) Sutter (1976) have taken a more statistical stance. Thus, for instance, Uttal emphasizes spatial autocorrelation functions, whereas Poggio and Sutter rely on Wiener polynomial expansions. In addition, Poggio treats the dendritic potential microstructure in terms of the Volterra solution of cable equations. His carefully worked out proposal includes a stage of Fourier analysis and another in which the Laplace transform occurs. David Marr, Tomaso Poggio, and Whitman Richards (Marr, 1976a, 1976b; Marr & Poggio, 1977; Richards, 1977; Richards & Polit, 1974) are developing a model based on repetitive convolving of Laplacians of a Gaussian distribution. E. Roy John speaks of "hyperneurons" constituted of the distributed system of graded potentials he records from the brains of problem-solving animals. Such organizations have been described in terms of Lie groups by Hoffman (1970), vector matrices by Stuart, Takahashi, and Umezawa (1978), and tensor matrices by Finkelstein (1976) in which the tensors represent multidimensional Fourier transforms. Finally, Edelman & Mouuncastle (1978) have proposed a degenerative group model, also based on an essentially random connectivity.

On looking over these various proposals, one finds commonalities and distinctions that can be summarized as problem areas that need further inquiry: (1) To what extent is the idealization warranted that the brain cortical connectivity is essentially random? This issue was discussed earlier in this chapter. In addition, the models proposed by Hoffman and by Poggio clearly opt for nonrandomness, whereas the others are either explicitly or implicitly based on the assumption that an idealized random connectivity is not too far from actuality. (2) To what extent can brain systems be treated with linear (and reversible) equations, and to what extent must nonlinearities be introduced to explain the available data? Good evidence is at hand that the primary sensory systems (as discussed throughout this chapter) and primary motor systems (see, e.g., Granit, 1970) are essentially linear in most of their overall operations despite many local nonlinearities. Overall nonlinearities are apparently introduced into the system when decisions have to be made—decisions involved in discriminating between inputs, in performing this rather than that action. Decisional operations have been shown to be local functions of the intrinsic (association) systems of the brain (Pribram, 1972a, 1972b, 1974, 1977a, 1977b). Thus, the question is raised as to how these nonlinearities relate to the essentially linear sensorimotor functions. (3) Nonlinear decisional operators can enter the system in two ways: They can be imposed by a parallel corticifugal process upon the sensorimotor systems (Christensen & Pribram, 1979; Pribram, 1971a, 1974; Pribram, Spinelli, & Reitz, 1969; Ungerleider & Pribram, 1977), or the decisions can be attained by a serial processing hierarchical abstraction of the relevant variables (see, e.g., Gross, 1973; Mishkin, 1973; Weiskrantz, 1974). It is, of course, also possible that the hierarchical serial process operates during learning (as, e.g., suggested by Hebb,

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1949) while parallel corticifugal operators determine momentary perceptions and performances. (4) These nonlinear decisional operators are localized to one or another brain system. Two major classes of such operators can be distinguished. One is a set of sensory-specific processes that involve the posterior cerebral convexity (inferotemporal cortex for vision; superior temporal for audition; anterior temporal for taste; posterior parietal for somesthesia). In addition, a set of higher-order, executive—that is, context-sensitive—processes has been identified to involve the frontolimbic portions of the forebrain (see, e.g., reviews by Pribram, 1954, 1969, 1973).

When these decisional processes operate on the distributed memory store, they re-member an input that had on earlier occasions become dismembered. The sensory-specific operators deal with recognition and with the processing of referentially meaningful information. The frontal lobe executive operators deal with recall and with the pragmatics of processing context-sensitive, episode-related instances (for review, see, e.g., Pribram, 1971a, 1977a).

The persistent puzzle that brain functions appear to be both localized and distributed is thus resolved. Memory storage is shown to be distributed; decisional operators involved in coding and retrieval are localized. These operators can be conceived as separate brain systems, genetically inherent in their function but dependent on sensory input from the environment to trigger and shape their development (see, e.g., Chomsky, 1980; Pribram, 1971b). In short, there are "boxes in the brain," each "box" corresponding to a "faculty of mind." But these "boxes" operate on a distributed matrix that is nonlocal and therefore available to all.

Perhaps the easiest way to conceptualize this "model" of brain function is in terms of states and operators on those states. At present it appears reasonable to continue to search for linearities in the state descriptions of sensory perception, highly practiced skilled action, and memory storage processes. The greater part of this manuscript has been devoted to detailing problems inherent in such state descriptions. Only in this final section have we briefly dealt with the abundant evidence that these states come under the control of localized nonlinear operators whenever discriminate decisions (e.g., recognition) or selective (planned) actions are involved. Whether these nonlinearities are abstracted serially and hierarchically from the states or whether they are imposed corticifugally by a parallel process—or both—continues to be an active area of investigation.

CONCLUSION

There is a considerable intellectual distance between Lashley's despair in finding a localized engram in 1950 and the richness of data and theory on cerebral localization and distribution in 1980. To his credit, Lashley recognized the problem and specified it in sufficient detail so the generation of investigators

standing on his shoulders could deal effectively with it. That so much progress has been made reflects the support given by society to the brain and behavioral sciences during this 30-year period. Should this support continue, the issue of localization-distribution that has mobilized such differing views over the past two centuries may yet be resolved before the end of the twentieth.

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NEUROPSYCHOLOGICAL INDICATORS
OF A SUBCORTICAL DISORDER

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INTRODUCTION

Although cognitive and emotional impairments secondary to subcortical dysfunction are common, very little, if any, attention has been devoted to using neuropsychological tests to identify subcortical disorders. For example, virtually no mention is made of neuropsychological indicators to identify subcortical disorders in such authoritative texts as Lezak's Neuropsychological Assessment, (Lezak, 1976, 1983), Human Neuropsychology (Hecaen and Albert, 1978), Golden's Clinical Interpretation of Objective Psychological Tests (Golden, 1979), Handbook of Clinical Neuropsychology (Filskov and Boll, 1981, 1986) or Clinical Neuropsychology (Heilman and Valenstein, 1985).

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As a consequence, many patients with subcortical disorders are misdiagnosed by neuropsychologists or, even worse, are often characterized as malingers or hysterics. The purpose of this paper is to present neuropsychological indicators that the author and his associate, Dr. Arnold D. Purisch, have developed to identify the presence of a subcortical disorder. The following case example illustrates the difficulty that clinical neuropsychologists have in recognizing behavioral sequelae secondary to a subcortical disorder and their tendency to misdiagnose or mislabel them.

CASE EXAMPLE

The patient is a 28-year-old White male, who was working as pipeline welder in the North Sea when a fire ignited while he was working inside a large pipe. He inhaled noxious fumes consisting of carbon monoxide and hydrochloric acid from the burning insulation material and lost consciousness. He was removed from the pipe in a comatose state. He was found on later examination to exhibit a left hemiparesis. CT scans and electroencephalograms taken shortly after were found to be within normal limits. After he returned home, he began exhibiting severe depression, headaches, sexual impotence and mental lethargy. He also exhibited spells of uncontrollable crying and complained of recent memory difficulties. He was hospitalized for depression and headaches.

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Several different anti-depressant medications (e.g., Sinequan, Elavil, Asendin) were tried during hospitalization with varying results. After discharge, he began seeing a psychiatrist for outpatient psychotherapy and medication followup. The patient underwent at least three different neuropsychological examinations by generally well-respected and experienced neuropsychologists.

DR. "A"

Dr. "A" reported that the patient, in addition to his severe depression and headaches, complained of difficulty in thinking, forgetting his train of thought, word-finding difficulties and decreased ability to manipulate numbers, as well as spelling difficulty. The patient also complained of brief episodes of loss of consciousness with occasional urine and bowel incontinence. The patient also reported smelling unusual odors, occasional vomiting, increased temper outbursts and continued sexual impotence. The patient reported no previous history of psychiatric problems, alcohol or drug abuse, or major physical illnesses. Dr. "A" reported that the patient achieved a Verbal I.Q. of 95, a Performance I.Q. of 94, and a Full-Scale I.Q. of 88. On verbal subtests, he showed strength in mental calculation skills, in spite of his complaints of decreased ability to perform arithmetic. Adequate social judgment and abstract

reasoning were demonstrated. He showed a severerly impaired ability to immediately recall digits. On non-verbal subtests, he showed an above-average ability in visuospatial organization and conceptual skill, whereas visuoconstruction and sequential thinking abilities were in the average range. Attention to detail, visual scanning skills and visual motor coordination and speed were significantly lower than other non-verbal skills. He obtained a Memory Quotient of 81 on the Wexler Memory Scale. He demonstrated a good fund of current information. His recall of two verbally-presented stories was slightly impaired. He showed more impairment in his recall of geometric designs. He was able to learn easy word pairs but had trouble with more difficult associations. The Halstead-Reitan Battery yielded an Impairment Index of 0.4. He was found to be markedly impaired in his performance on the Speech-Sounds Perception Test and the Seashore Rhythm Test. However, his performance on the Category Test fell within the normal range. His motor tapping speed was found to be markedly impaired bilaterally, however, his left hand was significantly slower than his right. He was able to execute simple psychomotor tasks (Trails A) and was able to alternate between numbers and letters without error (Trails B) but performed both of these tasks extremely slowly. His performance on the Wisconsin Card Sorting Test, a test of mental flexibility and

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problem-solving, was within normal limits. Dr. "A" diagnosed the patient as having sustained a post-traumatic stress disorder and felt that the patient's left-sided perceptual and motor difficulties were secondary to organic dysfunction.

DR. "B"

Dr. "B" administered the Verbal Fluency (FAS) task, which the patient performed in a severely impaired manner, producing three, six, and six words over the period of one minute each. When he was given a more difficult task, which required him to name as many items as possible belonging to specific categories (Animals, Fruits and Vegetables, and First Names), the patient's performance was found to be generally intact. The patient could recall only two digits forward and two digits backward on the Digit Span subtest of the WAIS-R. Dr. "B" observed that the patient had no difficulty copying drawings. He also found that the patient demonstrated good comprehension of speech from others, both in testing and in non-testing situations. His ability to communicate was found to be excellent. There was no suggestion of word-retrieval difficulties and, in general, the patient appeared quite intelligent. On the Wechsler Adult Intelligence Scale, the patient was found to have a Verbal I.Q. of 79, a Performance I.Q. of 83, and a Full-Scale I.Q. of 80. Dr. "B" felt that the patient's decline on this test from previous testing most likely reflected motivational rather than neuropsychological factors.

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He was able to complete all six categories on the Wisconsin Card Sorting Test and made a total of 22 errors. He tested well within the Average Range on the Categories Test. He performed at the 90th percentile on the Shipley-Hartford Test of Conceptual Reasoning with indications that his performance reflected good abstract skills. He obtained a Wechsler Memory Scale Quotient of 103. He was able to do well on the easy word pairs of the Paired Associates Test but had considerable difficulty with some of the harder pairs. He was able to recall only five out of 12 words with repetitions on the Bushke Selective Reminding Test, however, on the Recognition Test, he obtained a score of nine out of 12. His performance on the WAIS-R indicated average to very superior performances in visual organization, higher-order spatial perception, temporal sequencing and visual discrimination tests. On the Trail Making Test, he took an extremely long time to perform Parts A and B but performed them without error. On the Finger Tapping Test, he obtained a mean score of 51.3 taps with his right hand and a score of only 20 taps with his left hand. His profile on the MMPI was found to be valid and revealed significant depression with some symptom exaggeration. Dr. "B" felt that the numerous inconsistencies in this patient's cognitive functioning ruled out an underlying organic etiology. Dr. "B" also felt that the patient's performances were highly suggestive of a functional disorder and raised the possibility of malingering.

DR. "C"

Dr. "C" reported that the patient obtained a Verbal I.Q. of 79, a Performance I.Q. of 75, and a Full-Scale I.Q. of 76. He reported considerable variability among his subtest scores, ranging from a scale score of 2 on the Digit Span and Symbol Digit Modalities Tests to an 8 on Similarities in Information and a 9 on Object Assembly. His performance on the Halstead-Reitan Neuropsychological Battery produced an Impairment Score Index of 0.6, in that he scored in the impaired range on four of the seven tests, which compromised this index. He exhibited evidence of severe impairment in his motor speed with his left hand on the Finger Tapping Test, severe impairment of his manipulative dexterity when using his left hand and when using both hands simultaneously on the Purdue Pegboard Test, severely impaired performance in his attention, concentration and fine discrimination on the Seashore Rhythm Test and Speech-Sounds Perception Test, and severe impairment in his learning of hard pairs of words on the Wechsler Memory Scale. His ability to recognize learned words was much greater than his free recall skills. He performed Trails A and B extremely slowly but failed to make any errors. On the positive side, he performed in the Normal Range on the Category and Wisconsin Card Sorting Test. There was no evidence of aphasia or word-finding difficulties. His performance with his right hand was found to be intact on the Tactual Performance Test. Dr. "C" felt that the inconsistencies seen between the patient's intact

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performances on more complex and difficult tasks of problem-solving, such as the Category and Wisconsin Card Sorting Tests and the patient's poor performances on the Trail Making Test, Symbol Digit Modalities Test and Digit Span Test most likely represented malingering. He felt that it was highly unusual for a patient to fail relatively simple tasks yet perform more difficult tasks correctly, and that this, in Dr. "C's" opinion, most likely reflected motivational factors.

ANALYSIS

While each of the examiners observed inconsistencies between the patient's performance on very simple and complex tasks, several consistent findings were contained in each of the examiner's reports. For example, the patient's auditory encoding skills, particularly with respect to the amount and rate of information processed, was found to be markedly impaired. By way of contradiction, the patient appeared to have little difficulty comprehending spoken language. The patient's ability to process information was found to be markedly impaired, yet he made few errors on complex cognitive tasks. In other words, the patient was observed to have considerably more difficulty with lower-order attentional tasks and little, if any, difficulty with higher-order attentional tasks. Tasks which contained a speed component were performed very slowly but generally done accurately. His speed of cognitive processing, as well as his

speed of motor movements, was found to be abnormally slow. This was particularly true at the motor level, when the patient was tested with his left hand. The patient's ability to learn new information was seen to be markedly impaired on tasks requiring free recall but only slightly impaired on tasks involving recognition. Thus, taken together, results of the three examiners reveal evidence of dramatic consistency when they are examined within these dimensions. It is interesting to note that, in spite of being aware of the patient's etiology, one of the examiners felt that the neuropsychological test results warranted the diagnosis of organic dysfunction. The remaining two examiners diagnosed the patient as having functional disorders and, in fact, tended to label the patient as either "hysterical" or "malingering."

DISCUSSION

A careful review of the leading and most influential textbooks in neuropsychology finds little or no mention of subcortical disorders in their clinical manifestations. No mention is made in any of these texts of criteria which can be used by the clinical neuropsychologist to differentiate between cortical and subcortical disorders. While a complete discussion of cortical disorders is beyond the scope of this paper, cortical disorders are generally displayed in terms of the accuracy or effectiveness of the patient's behavioral responses. For example, patients

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with right posterior lesions will exhibit prominent inaccuracies in their drawing skills or be unable to read a roadmap. Patients with left hemisphere lesions will typically display marked impairments in their ability to understand or use language. Subcortical disorders, on the other hand, appear to affect the amount and speed at which information is processed and the patient's ability to perform relatively automatic or lower-order attentional tasks. While both patients with cortical dysfunction and patients with subcortical dysfunction will be impaired in their ability to retrieve new information, the patient with a subcortical disorder will typically be far less impaired on recognition tasks. While patients with cognitive dysfunction will typically display what can best be described as "tonic" impairments, in that they remain relatively stable, patients with subcortical dysfunction will often display "phasic" impairments with regard to their cognitive function. For example, it has been the author's experience that these patients will frequently complain of "fading in and fading out" during the course of the day and show considerable variability in their cognitive performances during testing.

At the emotional level, patients with cortical dysfunction will often display euphoria or a flat affect, while many patients with subcortical disorders will complain of depression and anxiety, which typically does not respond well to anti-depressant medications. Patients with subcortical disorders are also more

likely to show episodic bursts of rage. Many patients with subcortical dysfunction will also complain of fatigue, headaches, vomiting and "seizure-like events." At the social level, these patients typically become emotionally withdrawn and avoid the company of others, whereas patients with cortical injuries are less prone to become socially isolated.

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HEALTH PSYCHOLOGY
PAPERS

PERCEIVED SELF-EFFICACY AND HEALTH FUNCTIONING

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PERCEIVED SELF-EFFICACY AND HEALTH FUNCTIONING

It is now widely acknowledged that people's health rests partly in their own hands. To prevent the ravages of disease, they must exercise control over habits and environmental conditions that impair health. How well they cope with the demands of everyday life can affect physiological systems that determine the quality of health at any given time. Psychosocial determinants of health status operate, in part, through the exercise of personal agency.

Among the mechanisms of personal agency, none is more central or pervasive than people's beliefs in their capability to exercise control over their own motivation and behavior, and over environmental demands. Evidence from diverse lines of research shows that perceived efficacy operates as one psychological mechanism linking psychosocial influences to health functioning.

Definition and Diverse Effects

* SLIDE *

People's beliefs in their efficacy affect:

- what they choose to do
- how much effort they will mobilize in a given endeavor
- how long they will persevere in the face of difficulties and setbacks
- whether their thought patterns are self-hindering, or self-aiding
- and the amount of stress and depression

they experience in coping with environmental demands.

Sources of Perceived Self-Efficacy

People's beliefs about their efficacy can be altered in four principal ways.

* SLIDE *

Performance Accomplishments. The most effective way of instilling a strong sense of efficacy

is through mastery experiences. Successes build a robust sense of efficacy. Failures undermine it, especially if failures occur early in the course of events.

Vicarious Experience. The second method is through modeling. People partly judge their capabilities in comparison with others. Seeing people similar to oneself succeed by perseverant effort raises observers' beliefs about their own capabilities. The failures of others instill self-doubts about one's own ability to master similar tasks.

Social Persuasion. Social persuasion is the third mode of influence. We try to talk people into believing they possess the capabilities to achieve what they seek. Realistic boosts in efficacy can lead people to exert greater effort, which increases their chances of success. However, to raise unrealistic beliefs of personal competence runs the risk of inviting failure.

Physiological State. People rely partly on their physiological state in judging their capabilities. They read their anxiety arousal and tension as signs of vulnerability to dysfunction. In activities involving strength and stamina, people interpret their fatigue, aches, and pains as indicants of physical inefficacy. The fourth way of modifying efficacy beliefs is to change people's physiological reactions and how they interpret their bodily states.

Postcoronary Rehabilitation

I should like to illustrate how these different modes of influence can be used to build perceived efficacy with research on recovery from a heart attack.

About half the patients who experience myocardial infarctions have uncomplicated ones. Their heart heals rapidly, and they are physically capable of resuming an active life. But the psychological and physical recovery is slow for patients who believe they have an impaired heart. They avoid physical exertion. They fear that they cannot handle the strains in their vocational and social life. They give up recreational activities. They fear that sexual activities will do them in.

The recovery problems stem more from patients' beliefs that their cardiac system has been

impaired, than from physical debility. The rehabilitative task is to convince patients that they have a robust cardiovascular system and that they can lead full, productive lives. At the Stanford Cardiac Rehabilitation Program, the cardiologists informally use the four sources of efficacy influence to convince patients of their cardiac capabilities.

- They use physical accomplishments on the treadmill to demonstrate to patients their cardiac capabilities.
- They use modeling, by having ex-patients exemplify the active lives they are leading. This helps to strengthen belief in the restorability of cardiac function.
- Physicians use their expertise to convince patients of their physical capabilities.
- They also correct patients' tendency to misread their physiology if they misattribute to an impaired heart fluctuations in physical functioning, arising from other causes.

The initial study in this program of research demonstrated that having patients master increasing workloads on the treadmill, and persuasive medical counseling both strengthen patients' beliefs in their cardiac capabilities. The stronger their perceived efficacy, the more active they become in their home environment.

Ewart and his colleagues have further shown that patients' perceived physical efficacy predicts compliance with prescribed exercise programs, whereas actual physical capability does not. This further demonstrates that the effect of treadmill experiences on activity level is largely mediated by changes in perceived efficacy. Patients who have a high sense of efficacy tend to overexercise; those who doubt their physical efficacy underexercise at levels that provide little cardiovascular benefits.

Interactive Efficacy and Postcoronary Recovery

Psychological recovery from a heart attack is a social, rather than an individual matter. The patients are almost always males. The wives' judgments of their husbands' physical and cardiac capabilities may aid or retard the recovery process. Spousal support is likely to be expressed in

curtailment of activity if the husband's heart function is regarded as impaired, but as encouragement of activity if heart function is judged to be robust. We explored ways in which the treadmill might be used to raise and strengthen spouses' beliefs of the patients' capabilities.

Several weeks after patients have had a heart attack, we measured how capable they judged themselves to withstand physical and emotional strain, and their beliefs about how well their heart could sustain high levels of activity. The next slide shows the scale we used to measure beliefs about cardiac efficacy. Patients recorded how much strain they believed their heart could

* SLIDE *

withstand. The judgment of cardiac efficacy is especially interesting because it must be inferred from uncertain physiological indicants, such as fatigue, shortness of breath, pain, and level of stamina. Because any number of conditions can produce such effects, they are easily subject to misinterpretation, especially after people have had a heart attack.

Patients performed the treadmill, mastering increasing workloads. We varied the degree of spouse involvement in the treadmill activity.

- In one group, the husband performed the treadmill exercises alone.
- In a second group, the husband performed the treadmill, and the wife was present to observe what he could do.
- In a third group, the wife observed her husband perform the strenuous treadmill task. She then performed the treadmill exercises herself to gain firsthand information of the physical stamina it requires. We reasoned that having the wives personally experience the strenuousness of the task, and seeing their husbands match or surpass them, should convince them that their husband has a tough heart.

After the treadmill activities, the couple met with the cardiologist who explained the patients' capabilities to resume activities in their daily life. If the treadmill is regarded as an isolated task, it

impact on perceived cardiac capability may be limited. The stamina on the treadmill was, therefore, presented as a generic indicant of their cardiovascular capability--that the patients' level of exertion exceeded whatever strain everyday activities might place on their cardiac system. This would encourage them to resume activities in their everyday life that place weaker demands on their cardiovascular system than did the heavy workloads on the treadmill. We measured the patient's and spouse's beliefs about his physical and cardiac capabilities, before and after the treadmill activity, and again after the medical counseling.

The next slide summarizes the changes in perceived physical and cardiac efficacy. P is the pretest efficacy. T is the perceived efficacy following the treadmill task. C is the perceived efficacy after the consultation with the cardiologist.

Figure 1

- Treadmill performances increased patients' beliefs in their physical and cardiac capabilities.
- At the outset, the wives regarded their husband's cardiac capability as severely debilitated.
- Wives who were either uninvolved, or merely observed the treadmill performances, continued to believe that their husband had an impaired heart. Even detailed medical counseling did not alter their beliefs.
- Wives who personally experienced the strenuousness of the treadmill were persuaded that their husbands had a robust heart that could withstand the normal strains of everyday activities.

The participant experiences apparently altered the spouses cognitive processing of treadmill information, giving greater weight to indicants of cardiac robustness than to symptomatic signs of cardiac debility. The change in perceived efficacy increased the persuasiveness of the medical counseling. It further strengthened the wives' beliefs in their husbands' capabilities.

Correlational analyses reveal that the higher the patients' and wives' beliefs in the patients'

cardiac capabilities, the greater was the patients' cardiovascular functioning as measured on the treadmill, 6 months later. Initial treadmill performance does not predict level of cardiovascular functioning 6 months later when perceived efficacy is partialled out. But perceived cardiac efficacy predicts level of cardiovascular functioning when initial treadmill performance is partialled out. The degree of recovery seems to be associated more with beliefs about the strength of the heart, than with beliefs about physical capabilities.

Wives who believe that their husbands have a robust heart are more likely to encourage them to resume an active life, than those who believe their husband's heart is impaired and vulnerable to further damage. Pursuit of an active life improves the patient's physical capability to engage in activities without overtaxing their cardiovascular system.

Anxiety and Stress Reactions

People's beliefs about their coping efficacy affect their stress reactions in taxing situations as well as *their motivation and behavioral functioning*. *Social cognitive theory* conceptualizes anxiety and stress reactions in terms of perceived inefficacy to exercise control over potentially aversive situations.

- If people believe they can deal effectively with potential threats they are not perturbed by them.
- But if they believe they cannot control threatening situations, they dwell on their coping deficiencies, and see the environment as fraught with danger. In so doing, they distress themselves and constrain and impair their level of functioning.

Studies conducted by Beck of people who suffer from acute anxiety reactions show that they judge themselves to be profoundly inefficacious in coping with everyday realities. Just prior to an anxiety attack, they generate frightening scenarios, in which they perceive themselves as

- inept, and defenseless individuals

- they cannot control themselves
- they disintegrate physically and mentally
- they behave in ways that produce catastrophic consequences

For example, just prior to giving a lecture, a college instructor visualizes himself

- doing an awful job
- students complain to the Department, and the Dean
- he is fired, and is repeatedly rejected, in his efforts to find another teaching job
- he ends up on skid row

It is difficult to deliver a spell-binding lecture if, in one's thoughts, one is wandering around skid row.

There is a growing body of evidence that exercise of control over stressors is a critical factor influencing neurophysiological functions that govern health and illness. Exposure to stressors without controlling efficacy activates stress-related hormones, endorphin release, and impairs immune function. Exposure to the same stressors with controlling efficacy has no adverse physiological effects. It is uncontrollable stressors that do the damage. These findings are based mainly on experimentation with animals. Efforts to verify these effects with humans have relied extensively on correlational studies in which occurrences of life stressors are related to indices of physiological functioning or disease.

We have devised a research paradigm combining strong phobic stressors with mastery modeling treatment that enables us to examine causal relationships under laboratory conditions with a high degree of control. Because a high sense of controlling efficacy can be quickly instilled through mastery experiences, we can create conditions incorporating phobic stressors with and without perceived controlling self-efficacy. By the end of each study, the phobia is eradicated in all participants so they all gain lasting benefits while contributing to knowledge.

To test the notion that a weak sense of coping efficacy creates stress, phobics tried to perform coping tasks they judged to be in their low, medium, and high efficacy range. We measured how much subjective stress and physiological arousal they experienced at each level of perceived self-efficacy.

- phobics display little stress on tasks for which they judge themselves fully efficacious. But as they cope with tasks for which they distrust their coping efficacy; their distress mounts; their heart rate accelerates; their blood pressure rises.

After their perceived coping efficacy is strengthened to the maximal level, by whatever mastery experiences were needed to do so, they manage the same stressors without experiencing any stress or autonomic arousal.

We carried this research one step further by examining how people's beliefs about their coping efficacy affect catecholamine release. This project was conducted in collaboration with Jack Barchas and Barr Taylor at the Stanford Medical Center.

Phobics were presented with coping tasks they judged to be in their low, medium, and high efficacy range, during which continuous blood samples were obtained through a catheter. The next slide shows the microrelation between efficacy belief and plasma catecholamine secretion.

Figure 2

- Epinephrine and norepinephrine levels were low when phobics coped with tasks in their high efficacy range.
- Self-doubts in coping efficacy produced substantial increases in these catecholamines.
- When presented with tasks that exceeded their perceived coping capabilities the phobics instantly rejected them. Both catecholamines dropped sharply.
- The dopac response differs markedly from the other catecholamines. Epinephrine and norepinephrine dropped upon rejection of the threatening task. Dopac rose to its highest level.

even though the phobics had no intention of coping with the task. Dopac seems to be triggered by the mere apperception that environmental demands overwhelm one's perceived coping capabilities.

After perceived efficacy was strengthened to the maximal level by guided mastery treatment, the previously intimidating tasks no longer elicited differential catecholamine reactivity. Thus, perceived coping efficacy, rather than the nature of the coping tasks, is the source of the catecholamine reactivity.

Mastery and Catecholamine Reactivity

Guided mastery is the most powerful vehicle for instilling a robust sense of coping efficacy in faint-hearted phobics. It provides persuasive confirmatory tests that one can exercise control over potential threats. However, intractable phobics are not about to do what they dread. One must, therefore, create an environment so that incapacitated phobics can perform successfully despite themselves. This is achieved by enlisting a variety of performance mastery aids. These are listed on the slide.

*** SLIDE ***

In this treatment approach, threatening activities are repeatedly modeled

- to demonstrate how coping strategies, are best performed
- and to disconfirm, the person's worst, fears.

We reduce difficult, or intimidating tasks to graduated subtasks of easily mastered steps. When phobics try and fail, they are quick to attribute the failure to personal incapacibilities. The therapist attributes the difficulty to task selection--the step is too large.

Joint performance with the therapist, who offers assistance, when needed, further enables fearful people to try things they otherwise would not consider doing on their own. Another method for overcoming resistance is to have the person perform the feared activity for only a short time

They are unwilling to risk scary tasks if they have to do them for a long time. But they are willing to try them with the added security that they won't have to endure distress for long. As they become bolder, the length of involvement, is extended.

With these types of performance aids, phobics quickly master what they had feared. As treatment progresses, the mastery aids are discontinued to verify that the coping attainments stem from the exercise of personal efficacy rather than from mastery aids. Self-directed mastery experiences are then arranged to strengthen and generalize the sense of coping efficacy.

Guided mastery treatment achieves widespread psychological changes in a relatively short time. It eliminates phobic behavior and stress reactions, creates positive attitudes, and eradicates phobic ruminations and nightmares. Evidence that mastery experiences eliminate nightmares and anxiety-ridden dream activity is a particularly striking generalized benefit.

In the project just described, we measured changes in catecholamine secretion as phobics conquered their phobia through guided mastery treatment. The next slide shows the plasma catecholamine levels at 5 demarcated stages in treatment.

Figure 3

- During the initial phases of treatment, when phobics lacked a sense of coping efficacy, even the mere sight, or minimal contact with, phobic objects activated catecholamine responses
- After the participants gained controlling efficacy, all three catecholamines dropped and remained relatively low even though the participants engaged in the most intimidating interactions with phobic objects.
- When they were asked to relinquish all control, which left them completely vulnerable, catecholamine reactivity promptly rose. This pattern of results is in accord with a mechanism involving controllability rather than simple extinction or adaptation over time.

Perceived Self-Efficacy and Control of Pain

Another line of research relating perceived efficacy to activation of physiological systems examines how people's belief in their coping capabilities facilitates exercise of control over pain. Pain is a complex psychobiologic phenomenon, influenced by psychosocial factors, rather than simply a sensory experience arising directly from stimulation of pain receptors. The same intensity of pain stimulation can give rise to different levels of conscious pain depending on how attention is deployed, how the experience is cognitively appraised, and the coping strategies used to modulate pain. There are several ways in which perceived coping efficacy can bring relief from pain:

- People who believe they can alleviate pain are likely to enlist whatever skills they have learned to do so. If pain mounts, those who judge themselves as inefficacious give up quickly, whereas those who believe they can exercise some control over their pain will persevere in their efforts.
- A sense of coping efficacy also reduces aversive arousal and bodily tension, which only exacerbate sensory pain and discomfort.
- Consciousness has a very limited capacity. It is hard to keep more than one thing in mind at the same time. If pain sensations are supplanted in consciousness, they are felt less. Dwelling on pain sensations only makes them more noticeable and, thus, more difficult to bear. Perceived efficacy can lessen the extent to which painful stimulation is experienced as conscious pain by diverting attention from pain sensations to engrossing activities. Thus, for example, attentional diversion enables long-distance runners to press on even though their body is wracked in pain. Were they to focus on their mounting pain sensations they could not continue for long.

Results of several lines of research indicate that perceived self-efficacy may mediate the potency of different psychological analgesics. Reese found that cognitive pain control techniques,

self-relaxation, and placebos all increase perceived self-efficacy to cope with and reduce pain. The more self-efficacious the persons judged themselves to be, the less pain they experience in later cold pressor tests, and the higher is their pain threshold, and pain tolerance.

Research further reveals that the benefits of relaxation through biofeedback may stem more from boosts in perceived coping efficacy than from the muscular exercises themselves. Holroyd and his colleagues told persons suffering from tension headaches that headaches would abate by relaxing facial muscles. In a series of biofeedback sessions some of the participants were trained to relax their facial muscles. The feedback tone was proportional to degree of relaxation--the more relaxed, the lower the tone. Unbeknownst to other participants, they were trained to tense their facial muscles which, if anything, should aggravate the condition. The contingency was reversed on them so that the more they tensed their facial muscles, the lower the tone. Over sessions, one group became good relaxers and the other group became good tensors of facial muscles. At the end of each session they received arbitrary feedback that they had achieved either a great deal of control over muscular tension or little control.

Regardless of whether people were tensing or relaxing, success feedback instilled a strong sense of efficacy that they could prevent the occurrence of headaches in different stressful situations. The higher their perceived efficacy, the fewer headaches they experienced. The actual amount of change in muscle activity achieved in treatment was unrelated to the incidence of subsequent headaches.

These findings indicate that the changes accompanying psychological treatments may result as much, if not more, from instilling beliefs of coping efficacy as from the particular skills imparted. To the extent that people's beliefs in their coping efficacy are strengthened, they approach situations more assuredly and make better use of the coping skills they have.

Cognitive Control of Arthritic Pain

That perceived efficacy makes pain easier to manage is confirmed by studies of acute and chronic clinical pain. A recent study by O'Leary shows that arthritic patients can substantially improve their functioning by enhancing their efficacy to exercise some control over their condition. Patients suffering from rheumatoid arthritis were taught how to use self-relaxation, attention refocusing, vivid imagery, and dissociation to lessen pain as they pursued their daily activities. They also used proximal goal-setting to increase their level of activity, and self-incentives to motivate their efforts. A matched control group of arthritic patients received an arthritis helpbook describing self-management techniques for coping with different aspects of arthritis and were encouraged to be more active.

Figure 4

Treatment increased patients perceived efficacy to reduce pain, and other debilitating aspects of arthritis, and to pursue potentially painful activities. The treated patients reduced their pain and inflammation in their joints, and were less debilitated by their arthritic condition. The higher their perceived coping efficacy, the less pain they experienced, the less they were disabled by their arthritis, and the greater the reduction they achieved in joint impairment. The more efficacious were also less depressed, less stressed, and they slept better.

The cognitive coping treatment did not alter immunologic function, but relationships were found between perceived coping efficacy and immunologic indices. There is some evidence that in the arthritic disorder the suppressor T-cell function of the immune system is depressed. This results in proliferation of antibodies, which is aided by helper T-cells. Arthritis is an autoimmune disorder in which the immune system produces antibodies that destroy normal tissues of the body. Increases in suppressor T-cells, which tend to suppress production of antibodies, suggest improvement in the immune system for this disorder. Perceived coping efficacy was associated with increases in the

number of suppressor T-cells and with a decrease in the ratio of helper to suppressor T-cells.

Mechanisms of Action

Although pain control by psychological means is well established, the mechanisms by which they alleviate pain are less well understood. We have recently examined whether cognitive techniques and placebo medication alleviate pain through psychological or opioid mechanisms. In addition, we sought to clarify the role of perceived coping efficacy in the control process.

Pain endurance can be achieved through different mechanisms. Pain sensations can be blocked at the locus of physiological transmission through endorphin release, which blocks pain transmissions. Or pain tolerance can be achieved by cognitive and attentional mechanisms that reduce consciousness of pain sensations. Most likely both mechanisms operate in the regulation of pain, but their relative contribution may vary with degree of controlling efficacy and stages of coping. A nonopioid mechanism may subserve pain tolerance while cognitive control works, but an opioid mechanism may come into play in later stages of coping when control techniques are no longer sufficient to attenuate mounting pain or to block it from consciousness.

To test some of these notions, people were either taught cognitive methods of pain control, administered a placebo presented as a medicinal analgesic, or they received no intervention. Following treatment, their perceived efficacy to control, and to reduce, pain and their tolerance of cold pressor pain were measured. Individuals in all conditions were then administered either naloxone, which blocks the opioid system, or a saline solution. Their pain tolerance was then measured at periodic intervals.

Figure 5

As shown in the slide, training in cognitive control heightened perceived efficacy to withstand and reduce painful stimulation. The enhanced efficacy was accompanied by a substantial increase in pain tolerance. Placebo medication increased subjects' perceptions that they could endure pain, but

did not persuade them that they were any more capable of reducing it.

Perceived self-efficacy predicted how well subjects managed pain. The stronger their self-beliefs in their ability to bear pain, the longer they endured mounting pain stimulation, regardless of whether their perceived efficacy was enhanced by cognitive means, or by placebo medication. The strength of the placebo response is predictable from how the placebo affected people's perceived self-efficacy to endure pain. Those who judged themselves efficacious to withstand pain with the supposed medicinal aid were good pain endurers. But those who continued to distrust their efficacy to manage pain, despite receiving the placebo medication, were less tolerant of pain. For people who lack assurance in their efficacy, failure to achieve relief from pain, even with the help of a medicinal analgesic, is only further testimony for their coping inefficacy.

Figure 6

As can be seen in the next slide, pain tolerance achieved by cognitive means is mediated through both an opioid mechanism and a nonopioid cognitive mechanism. Cognitive copers who were administered a saline solution increased in pain tolerance. In contrast, cognitive copers who were administered naloxone, an opiate antagonist, could not bear pain for long. The correlational findings show that the higher the subjects' perceived self-efficacy to reduce pain, the greater was the opioid activation. However, cognitive copers were able to increase their pain tolerance somewhat even under opioid blockage. This suggests a nonopioid component as well in the exercise of cognitive control over pain.

The findings also provide evidence that placebo medication may activate some opioid involvement. After the full time had elapsed for naloxone to exert its antagonistic effect, people in the naloxone condition were less able to tolerate pain than those who had been given saline.

The research I have reviewed thus far is concerned mainly with how perceived self-efficacy affects physiological systems that mediate health functioning. I should like to turn next to research

linking perceived efficacy to health-promoting behavior.

Perceived efficacy can affect every phase of personal change--whether people even consider changing their health habits. Whether they can enlist the motivation and perseverance needed to succeed should they choose to do so. And how well they maintain the changes they have achieved.

Perceived Efficacy and Adoption of Health Practices

People's beliefs that they can motivate themselves and regulate their own behavior plays a crucial role in whether they consider altering habits detrimental to health. They see little point to even trying if they believe they do not have what it takes to succeed. Thus, smokers who judge themselves incapable of giving up cigarettes do not mount the effort needed to do so, even though they acknowledge that smoking impairs their health. People with a low sense of efficacy not only forego preventive practices. If they judge themselves incapable of managing pain, they avoid corrective treatment as well.

Efforts to get people to adopt health practices that prevent disease rely heavily on persuasive communications. In such health messages, appeals to fear by depicting the ravages of disease are used as motivators, and preventive practices are recommended as guides for action. Excessive scare tactics can backfire by creating avoidance of grisly messages, and unnerving people already beset with self-doubts about their ability to control health threats.

People need enough knowledge of potential dangers to warrant action, but they do not have to be scared out their wits to act, any more than homeowners have to be terrified to insure their households. Rather, what people need is knowledge on how to control their health habits, and firm belief in their personal efficacy to turn concerns into effective action. This requires a shift in emphasis from trying to scare people into health, to empowering them with the tools for exercising personal control over their health habits.

The role of people's beliefs in their efficacy in adopting preventive practices is shown by

Beck and Lund. They studied the persuasiveness of health communications in which the seriousness of periodontal disease, and susceptibility to it, were varied. Patients' perceived efficacy that they could stick to the required hygienic routine was a good predictor of whether they adopted the preventive practices. Fear arousal had little effect on whether or not they did so. Slater has similarly found that perceived efficacy plays an influential role in the social diffusion of health practices promoted by mass media campaigns. The stronger the perceived efficacy, the more likely people are to adopt the recommended practices.

To be most effective, health communications should instill in people the belief that they have the capability to alter their health habits. Communications that explicitly do so increase people's determination to modify habits detrimental to their health. Entrenched habits rarely yield to a single attempt at self-regulation. Success is usually achieved through renewed effort following failed attempts. Human attainments, therefore, necessitate a resilient sense of personal efficacy. To strengthen the staying power of self-beliefs, health communications should emphasize that success requires perseverant effort so that people's sense of efficacy is not undermined by a few setbacks.

Perceived Efficacy and Change of Detrimental Habits

The impact of different methods of treatment on health behavior is partly mediated through their effects on perceived efficacy. The stronger the perceived efficacy they instill, the more likely are people to enlist and sustain the effort needed to change habits detrimental to health. This has been shown in studies in such diverse areas of health as postcoronary recovery; enhancement of pulmonary function; in patients suffering from chronic pulmonary disease; reduction in pain and dysfunction in rheumatoid arthritis; elimination of tension headaches; stress reduction; pain management; modification of eating disorders; adherence to prescribed remedial activities; adoption and adherence to programs of physical exercise; maintenance of diabetic self care; effective management of sexual advances and contraceptive use to avoid unwanted pregnancies; control of

sexual practices that pose high risk for transmission of AIDS; and control of addictive habits that impair health.

Perceived Efficacy and Maintenance of Change

It is one thing to get people to change their health habits. It is another thing to maintain those changes over time. Social influences can be arranged to effect changes in health-related behavior. But if these changes are to generalize and endure, people must operate as active agents in their own motivation and behavior. Because they preside constantly over their own behavior, they are in the best position to exercise influence over it.

Much of the research on self-directed change has centered on the skills needed to regulate one's own behavior. There is a difference between possessing skills, and being able to use them effectively, and consistently, under difficult circumstances. Perceived efficacy is often the difference between success and failure, because it determines whether people abort their efforts prematurely or persevere with whatever means and effort it takes to succeed. Development of self-regulatory capabilities requires instilling a resilient sense of efficacy as well as imparting skills. If people are not fully convinced of their personal efficacy they rapidly abandon the skills they have been taught when they fail to get quick results, or suffer reverses.

Exercise of Control Through Self-Efficacy Belief

A growing body of evidence shows that people who have a high sense of efficacy think, feel, and behave differently, from those who perceive themselves as ineffectual.

* SLIDE *

People who doubt their capabilities shy away from difficult tasks. They have low aspirations and weak commitment to the goals they choose to pursue. In taxing situations, they dwell on their personal deficiencies, the formidableness of tasks, and possible adverse results. Such distressing modes of thinking further undermine their efforts by diverting attention from how best to perform

activities, to concerns over personal deficiencies, and possible calamities. They decrease their efforts, and give up quickly in the face of difficulties. They are also slow to recover their sense of efficacy following failure or setbacks. Because they are prone to diagnose insufficient performance as deficient aptitude, it does not require much failure for them to lose faith in their capabilities. They fall easy victim to stress and depression.

* SLIDE *

In contrast, a strong sense of efficacy enhances psychological functioning in many ways. People who have high assurance in their capabilities approach difficult tasks as challenges to be mastered, rather than as threats to be avoided. Such an affirmative orientation fosters interest, and engrossing involvement in activities. They set themselves challenging goals, and maintain strong commitment to them. They heighten their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks.

Because success usually comes through renewed effort following failed attempts, to abort efforts prematurely limits personal accomplishments. It is resiliency of perceived efficacy that counts. In his book, titled *Rejection*, John White provides vivid testimony that the striking characteristic of people, who achieved eminence in their fields, is an inextinguishable sense of efficacy. This enabled them to override repeated early rejections of their work.

Benefits of Optimistic Self-Efficacy Belief

There is a growing body of evidence that human attainments, and positive well-being, require an optimistic sense of personal efficacy. This is because ordinary social realities are strewn with difficulties. They are full of impediments, adversities, setbacks, frustrations, and inequities. People must have a robust sense of personal efficacy to sustain the perseverant effort needed to succeed. Realists are easily dissuaded, or become cynics.

Evidence suggests that it is often the so-called normals who are distorters. Anxious and

depressed people have been compared in their skills and their self-beliefs, with those who are unburdened by such problems. The groups differ little in their actual skills. But they differ substantially in their beliefs about their efficacy. People who are socially anxious are often just as socially skilled as the more sociable ones. But socially active people think they are much more adept than they really are.

Depressed persons usually display realistic self-appraisals of their social competencies. The nondepressed view themselves as much more adroit than they really are. As depressed people improve in treatment, they show the self-enhancing biases that characterize the nondepressed.

In laboratory studies in which actions exert no control over outcomes, the depressed are quite realistic in judging they lack control. In contrast, nondepressed people believe they are exercising a good deal of control in such situations. Thus, the depressed appear as realists, the nondepressed as optimistic self-believers that they can exercise some influence over their environment.

Thus, the successful, the innovative, the sociable, the nonanxious, the nondespondent, and the social reformers take an optimistic view of their efficacy to exercise influence over events that affect their lives. If not unrealistically exaggerated, such self-beliefs foster personal and social accomplishments. This applies equally to health-promoting habits.

Building Resilient Self-Efficacy

Each of the ways of building efficacy can be used to develop a resilient sense of efficacy needed to override difficulties that arise from time to time. With regard to performance mastery, a resilient sense of efficacy is built through demonstration trails in the exercise of control over progressively more challenging situations. For example, as part of O'Leary's instruction in cognitive control strategies, arthritic patients were given efficacy demonstration trials in which they performed physical activities with, and without, cognitive control and rated their pain level. Evidence of lowered pain with cognitive control provided the patients with persuasive demonstrations that they

could exercise some control over pain by enlisting cognitive strategies. Efficacy validating trials not only serve as efficacy builders, but put to trial the value of the techniques being taught.

Modeling influences can be used to demonstrate how to reinstate control should a setback occur, and to show that success usually requires sustained effort. This strengthens perceived efficacy. Modeled perseverant success also alters the diagnosticity of failure experiences, as reflecting difficult situational predicaments rather than inherent personal inefficacy. Persuasive influences that instill self-beliefs conducive to optimal utilization of skills can also contribute to staying power.

The role of perceived efficacy in the maintenance of health behavior has been examined most extensively in vulnerability to relapse. Marlatt provides a conceptual model of the relapse process. He has identified a common relapse process for heroin addiction, alcoholism, and smoking in which self-regulatory efficacy is a contributing factor. The main precipitants of breakdowns in self-control include inability to cope with negative emotions, social pressures to use the substance, and interpersonal conflict. These types of experiences have been shown to undermine perceived efficacy to resist use of the substances. People who have the skills and assurance in their coping efficacy mobilize the effort needed to succeed in high-risk situations. Mastery of problem situations further strengthens their sense of personal control. When coping skills are underdeveloped and poorly used because of disbelief in one's efficacy, a relapse will occur. Selective recall of the pleasures, but not the adverse effects, of the substance further strains self-control. People who regard themselves as lacking efficacy attribute a slip to personal weakness. Having labeled themselves as powerless, they abandon further coping efforts, resulting in a total breakdown in self-control.

In testing the relapse model with smokers, people who have quit smoking judge whether or not they can resist smoking in situations known to arouse smoking urges. Although they have stopped smoking, they differ in their perceived efficacy that they can resist the craving for cigarettes. Perceived resistive efficacy predicts, months later, who will relapse, and how soon they will relapse.

Perceived efficacy also predicts how they are likely to respond to subsequent relapse, should it occur. Those who have a strong belief in their efficacy tend to regard a slip as a temporary setback, and reinstate control. In contrast, those who distrust their self-control capabilities experience a marked decrease in perceived efficacy after a slip and relapse completely.

Self-control skills, and belief in one's capabilities, are built largely through mastery experiences. Substance abuse poses special challenges in this regard. Triumphs over slips can strengthen coping efficacy but, in so doing, they may foster periodic lapses into old habits through assurance that one can always reinstate control. Hill examined the effects of controlled relapse with an intensive treatment in which people resumed smoking in a rapid puffing style that sapped any pleasure from it. They then regained control. This mastery experience was designed to build recovery skill and to counter any pleasurable expectations with resumed use of the substance. He found that the experience of reinstating control over a programmed relapse enhances long-term abstinence.

The challenge is to strengthen both resistive, and recovery, efficacy so that self-belief in each of these capabilities strengthens self-control. This may require instilling strong resistive efficacy, and only moderate recovery efficacy, sufficient to counteract judgment of complete inefficacy should a slip occur, but not so strong as to embolden trial of the substance.

Concluding Remarks

The hour is getting late, so I had better bring this talk to a close. The converging lines of evidence I have reported indicate that the self-efficacy mechanism plays an influential role in mediating the impact of psychosocial factors on physiological systems, and health-promoting behavior. The value of a psychological theory is judged not only by its explanatory and predictive power, but also by its operational power to effect change in human functioning. Social cognitive theory provides prescriptive specificity on how to build people's sense of efficacy in ways that contribute importantly to human betterment.

So, as you venture forth to promote healthful habits in others, or struggle with your own, may the efficacy force be with you.

Figure 1.

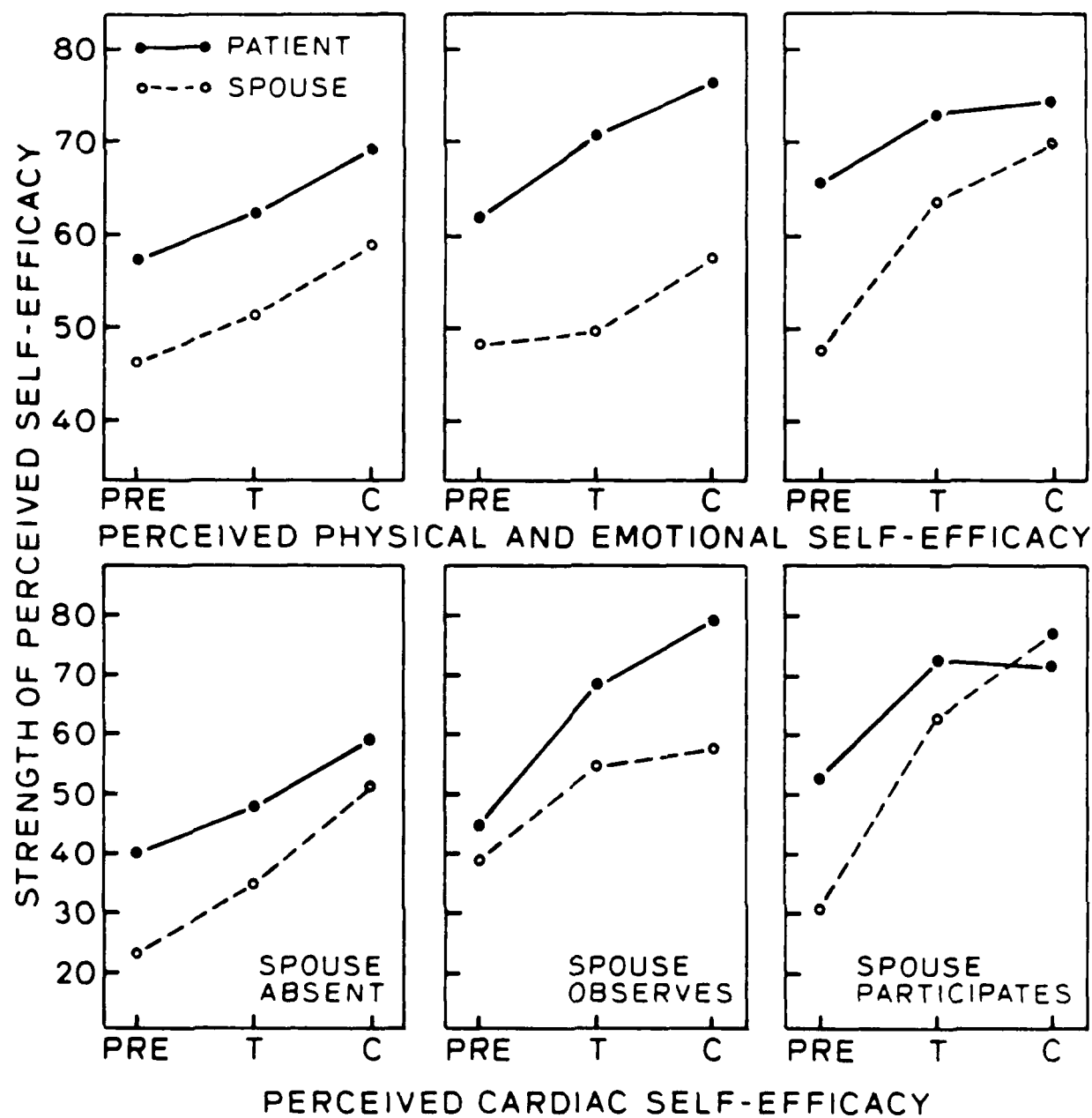


Figure 2.

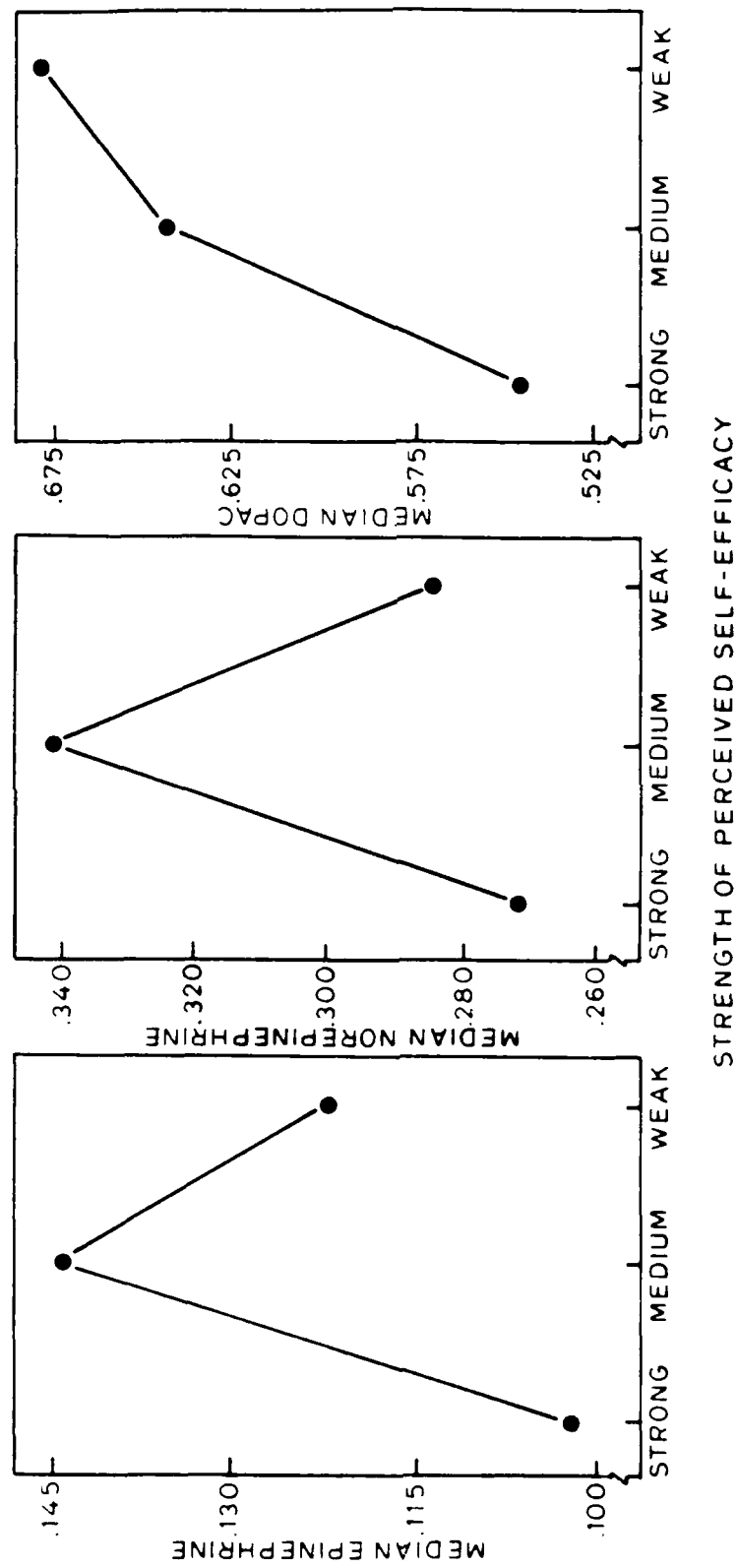
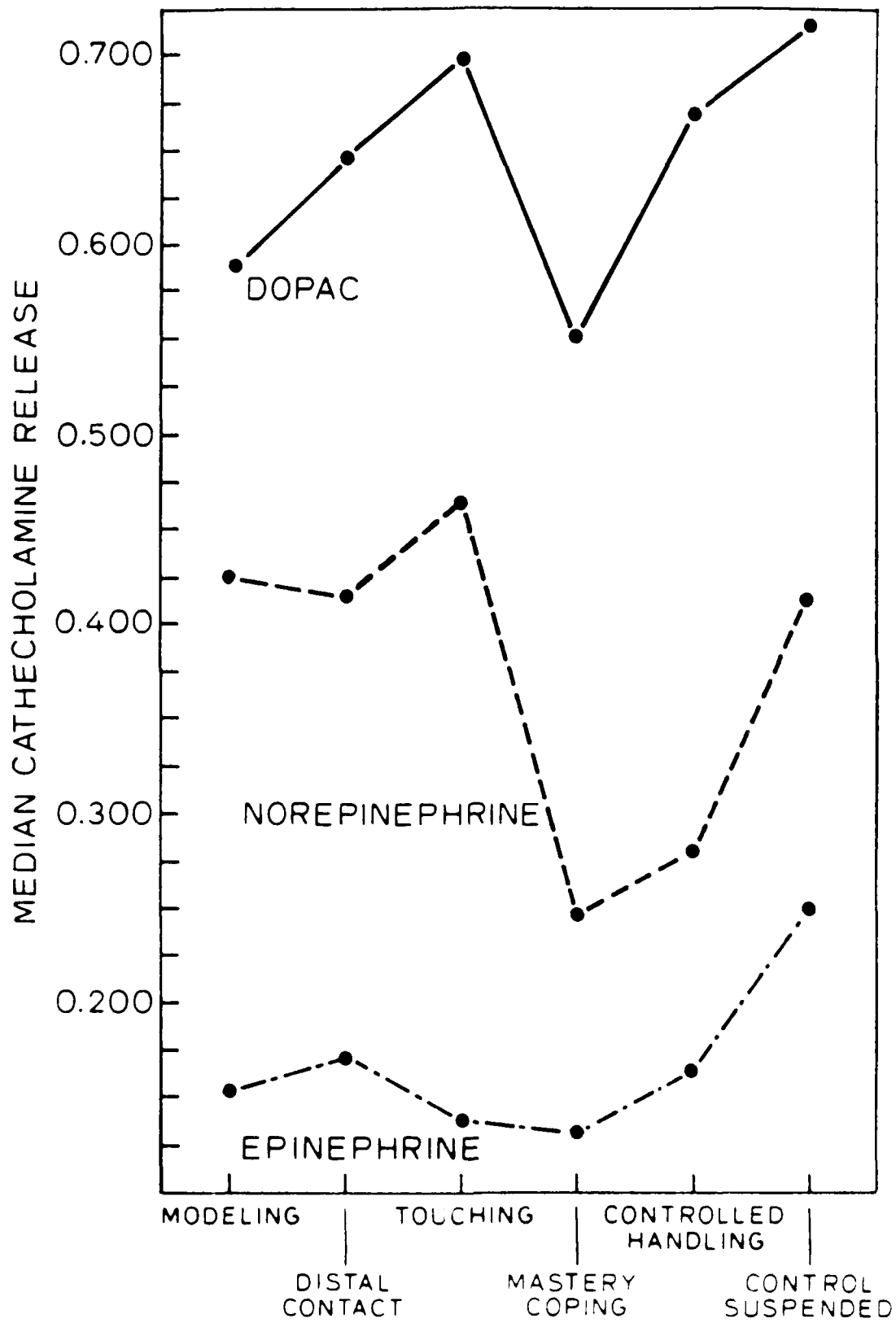


Figure 3.



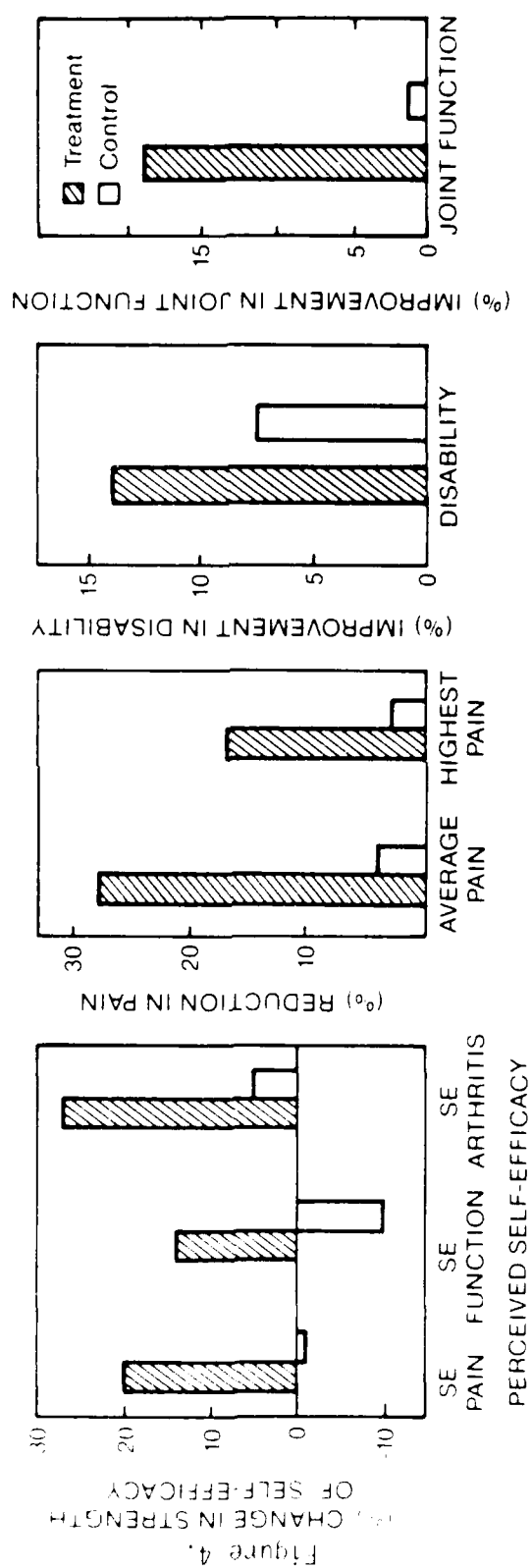


Figure 4.

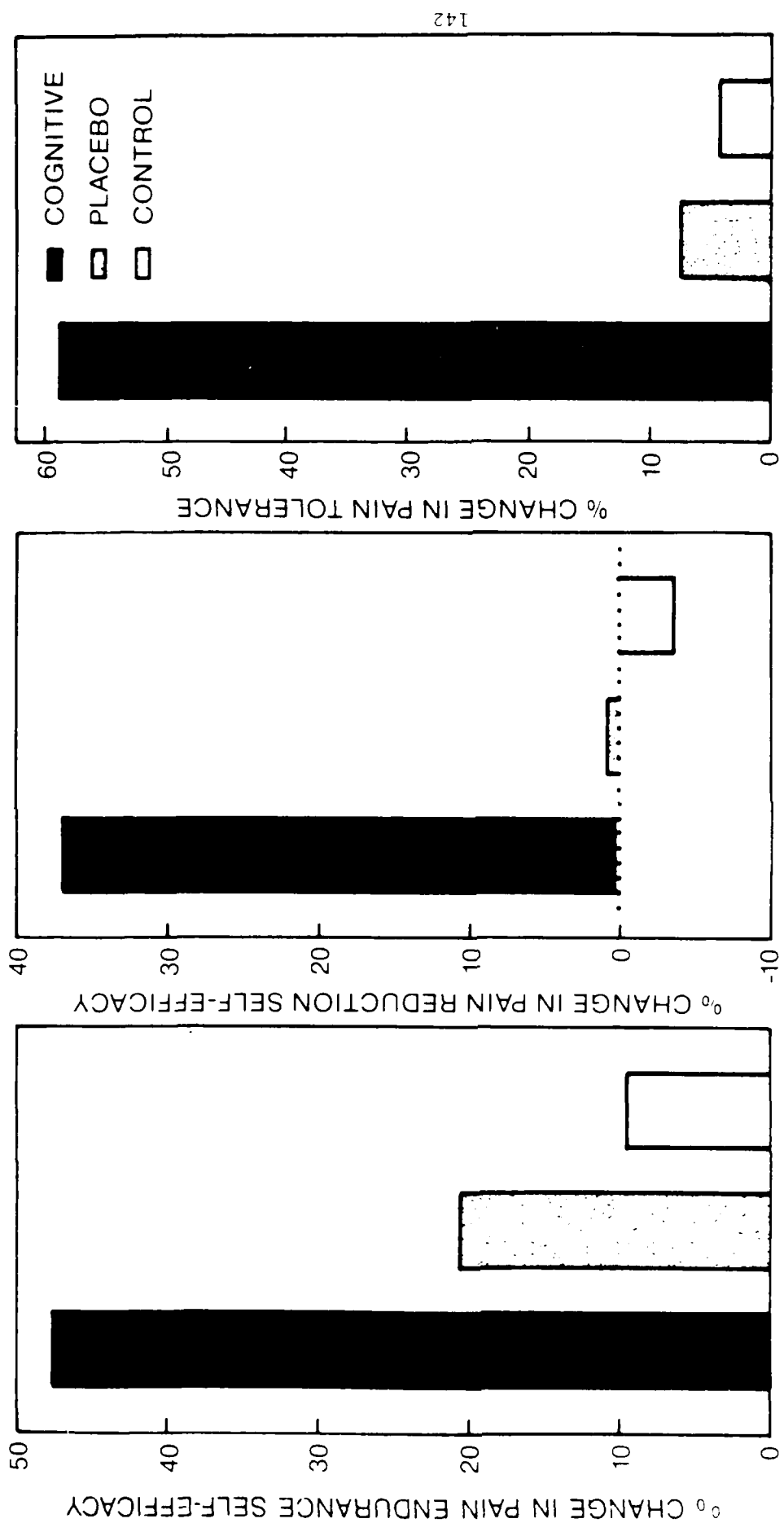
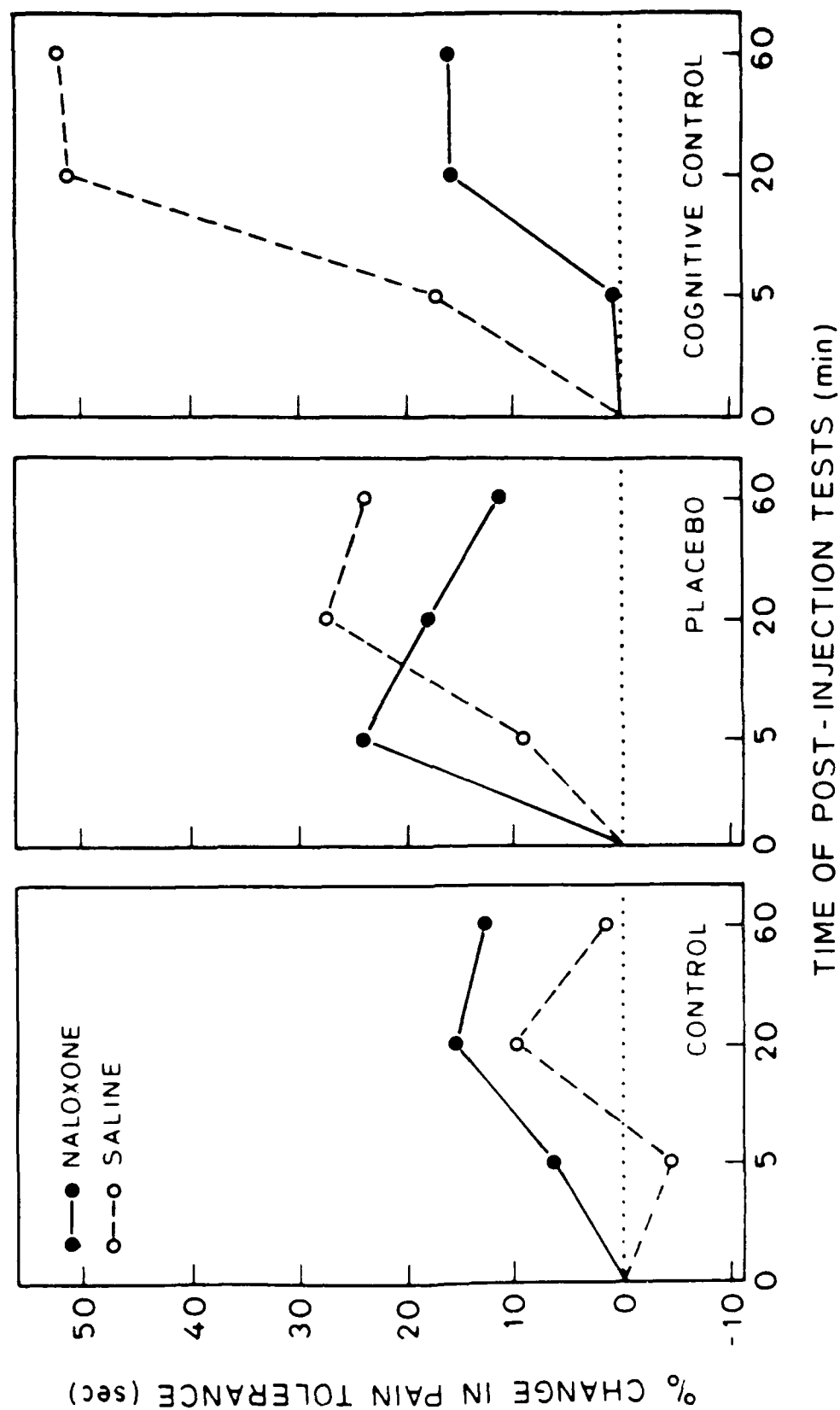


Figure 5.

Figure 6.



Psychologists who become involved in nonpsychiatric medical settings are often asked to assume their traditional assessment and research roles, but new populations and new diagnostic goals may require the use or development of new clinical tools. The APA Task Force on Health Research (1976) outlined a number of emerging activities that psychologists are likely to carry out in these settings. The burgeoning responsibilities associated with these new roles do not call for discarding familiar skills or techniques, nor do they require transforming oneself into a totally new professional. The task that faces the psychologist is to intelligently and creatively refine and extend previously acquired skills to fit these new responsibilities. One such skill, that of diagnostic assessment in a general medical setting, is the focus of this article. Fulfilling the role of medical psychodiagnostician may require considerable ingenuity and flexibility, since the task calls for tools and concepts other than those psychologists are likely to have been trained to employ in conventional mental health settings.

As far back as the 19th century, physicians such as Heinroth, Tuke, and Pidoux argued that a significant link existed between the mind and physical disease, supporting these beliefs with extensive case and anecdotal material (cited in Wolf, 1971). However, it is only in recent years that psychologists have been integrated into nonpsychiatric medical settings, because physicians have become increasingly attuned to the value of behavioral methods for studying and treating the impact of emotions on physical health. Along with other modern-day physicians, George Engel, a prominent internist-psychiatrist, contends that disease cannot be viewed as a thing in itself, unrelated to the patient as a unified whole, to his or her personality, bodily constitution, or mode of life (Engel, 1977). Numerous physicians, psychologists, and sociologists have spelled out the role that factors such as attitude, stress, and socioeconomic background play as influences that increase the susceptibility to and aggravate the course of various physical ailments (Mechanic, 1966; Millon & Millon, 1974; Parsons, 1964).

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Both physicians and nonmedical behavioral scientists are attempting to make precise assessments of the impact of these nonphysical processes. Studies of this sort can be separated into two broad categories. The first centers on identifying personality and psychosocial factors that relate to either the development or the exacerbation of various types of physical illness. The second focuses on maximizing treatment efficacy by reference to the patient's preexisting personality or psychological state. Increasingly, it is the psychologist rather than the psychiatrist who is given the major responsibility for developing ways to assess and interpret these psychogenic components as well as for pointing out their therapeutic implications. The essential problem is that of characterizing the psychological makeup of patients in a manner relevant to their physical illness and recommending the best means available for modifying the impact of identified negative psychological influences.

Psychological Assessment Methods in the Medical Setting

Diagnostic psychological tests are an established method for obtaining information relevant to patient management in mental health settings. However, using psychiatrically oriented psychological tests in settings of a primarily medical nature requires that their concepts and indices be translated to fit new populations and purposes. The major issue facing the psychologist is that medical populations are not psychiatric populations and that viewing patients with traditional mental health constructs may prove neither valid nor useful. Of course, standard techniques can provide general information, such as levels of emotional health or the presence of distinctive symptoms such as depression or anxiety. However, problems arise because of the unsuitability of norms, the questionable relevance of clinical signs, and the consequent inapplicability

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of interpretations. In brief, a standard interpretation of results obtained with a medical sample on a diagnostic test that was developed and designed to assess a psychiatric population runs hard against every major principle of sound test use. The problem is not merely an academic one, since physicians are turning every day to psychologists to assist them in making critical and even irreversible decisions, such as whether a patient is or is not a suitable risk for surgical intervention. Are our current diagnostic tests appropriate to such decisions?

Tests Used Essentially for Psychiatric Assessment

MINNESOTA MULTIPIHASIC PERSONALITY INVENTORY (MMPI)

This well-established 550-item inventory has been widely used with medical patients despite its original development for psychiatric diagnoses. Although a number of new medically oriented scales have been constructed in the past two decades, these scales have not been notably discriminating upon cross-validation. Furthermore, the MMPI is often viewed as excessively long and personally intrusive by medical patients. Many physicians note further that the instrument's results are not usually relevant to medical patient management (Sviland, 1973; Wilfling, Klonoff, & Kokan, 1973).

SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

This instrument is composed of 187 trichotomous items forming 16 factors. As with the MMPI, the scales and dimensions it contains are only tangentially related to medical issues. Its statements address interests, preference, and self-reports of behavior. In spite of its elegant construction methodology, substantial within-factor heterogeneity raises serious questions about scale homogeneity. Recent efforts to extend and adapt its use to the medical realm are only in the most preliminary of stages (Karson & O'Dell, 1976).

Tests Used Essentially for Medical-Behavioral Assessment

CORNELL MEDICAL INDEX

This multifactorial 195-item true-false questionnaire was developed in the 1940s to serve as a screening device to aid physicians in doing thorough initial interviews. The items are grouped by body systems, including the psychological system. Although individual items are often significant, the developers of the instrument did not intend to calculate score totals or scales. It is considered by many to be naive in construction and has not been recommended as especially incisive or illuminating as a medical-behavioral tool (Kalimo, Bice, Hovosel, 1970).

SOCIAL READJUSTMENT RATING SCALE

This single-dimension scale comprises a weighted list of recent changes in an individual's life that have been shown, in general, to be related to an increase in the incidence and severity of somatic illness. It is simple to administer and appears to have achieved a reasonable degree of stability in both cross-validation and cross-generalization studies (Holmes & Rahe, 1967; Rahe, 1977).

JENKINS ACTIVITY SURVEY

Similar to the Social Readjustment Rating Scale in that both focus on a single dimension, the Jenkins survey has taken several forms in recent years. The most frequently used form for research is the 61-item multiple-choice questionnaire designed to yield an overall measure of a coronary-prone behavior pattern. It has proved reasonably robust in a variety of both cross-validational and predictive studies (Jenkins, Rosenman, & Friedman, 1967; Jenkins, Rosenman, & Zyzanski, 1974).

Although each of the instruments described above serves some sphere of utility in the diagnostic evaluation of patients, they all suffer major limitations. As noted earlier, psychiatric instruments do not apply readily to general medical populations, and there is little cross-validation support for their use in such settings. The few medical-behavioral tests available today seem relevant to physically ill populations, but they appear to fall at the extremes of a continuum of breadth. The Cornell index is all encompassing, whereas the others evaluate only single dimensions, failing to consider the wide array of potentially significant components that may be relevant and operative in creating or sustaining the patient's problem.

Search for Relevant Behavioral Health Dimensions

Faced with the problems and limitations of current tools, the authors set out to develop a new self-report inventory that would be brief, relevant to medical-behavioral issues, multidimensional in scope, and, they hoped, valid. The project began in the early 1970s at a major university medical center. As the literature in this field was reviewed, a confusing and at times almost contradictory array of concepts and findings were found. Closer examination revealed that many of these results were, in fact, complementary, merely differing in their approaches to the patient and the disease process.

One major area of investigation focuses on what may be termed general *personality style*. These investigators believe that the patient's enduring personality pattern is central to understanding both the development of a disease and how the patient copes with it (Kahana, 1972). According to this thesis, enduring psychological tendencies cause individuals to react to stimuli with specific patterns of emotional, cognitive, behavioral, and physiological responses (Lipowski, 1977; Twaddle, 1972).

Other researchers have narrowed their attention to the impact of specific *psychogenic*

attitudes rather than general personality styles. These studies typically concentrate on single influences or dimensions, for example, stress is repeatedly found to relate to the incidence of a variety of diseases. More specifically, qualitative studies of *chronic stress*, such as persistent job tensions or marital problems, have been carried out with particular reference to their impact on heart disease (Friedman & Rosenman, 1974; Gersten, Frii, & Lengner, 1976; Jenkins, 1976; Rahe, 1977). Quantitative approaches along the same line of investigation have also been used (Holmes & Masuda, 1974; Rabkin & Struening, 1976). Many of these studies have focused on the incidence of *recent life stress*, relating it to the appearance of illness or the exacerbation of a preexistent condition.

Another major area of study may be termed the helplessness-hopelessness constellation. Evidence for the impact of either a *premorbid pessimistic* attitude or an outlook of *future despair* on physical disease seems well established. This constellation is in no way illness specific, however, since there are studies showing its relationship to a wide variety of diseases such as multiple sclerosis, ulcerative colitis, and cancer (Mei-Tal, Meyerowitz, & Engel, 1970; Paull & Hislop, 1974; Schmale, 1972). This depressive pattern has also been researched in relation to postoperative course; a good surgical outcome seems to be correlated with an acceptance of one's health problems and a positive, future-oriented attitude (Boyd, Yeager, & McMillan, 1973).

Another significant research perspective pertains to the role of what we have termed *social alienation*. Level of familial and friendship support, both real and perceived, appears to be a significant moderator of the impact of various life stressors (Cobb, 1976; Rabkin & Struening, 1976). All of these stressors seem to be significantly modulated upward or downward by the preoccupations and fears that patients may express about their physical state. Studies of what may be called *somatic anxiety* reflect the general concerns that patients have about their bodies (Lipsitt, 1970; Lucente & Fleek, 1972). As one reflects on these diverse psychogenic components, it becomes apparent that they evidence strong interrelationships. For example, the loss of a spouse means not only dealing with feelings of despair and depression but also dealing with the increased stress of social isolation, the possibility of financial hardship, and a variety of increased responsibilities, each of which serves as an additional source and compounding of stress.

There is a third group of researchers whose primary interest focuses on establishing clear *psychosomatic correlates* of disease. They study patients with identical physical ailments who can be differentiated in terms of the degree to which psychological factors are central contributors. This realm of investigation is closest to the classic concerns of the psychosomatic clinician, for example, is the patient evidencing an ulcer because of psychic stressors or because of some physiological-nutritional dysfunction? Questions such as these are addressed by physicians who seek to focus their therapeutic attention on the prime source of difficulty, for example, should treatment be geared to psychotherapy, medication, surgery, environmental management, or what? Among the major disease syndromes studied in this manner are allergies, gastrointestinal

problems, and cardiovascular disorders (Crown & Crown, 1973; Lipowski, 1975; McKegney, Gordon, & Levine, 1970; Pinkerton, 1973).

Still another area addressed by clinicians is the patient's response to illness or treatment and how the patient's psychological makeup affects the course of the illness or the treatment's efficacy. This search for *prognostic indices* is particularly significant in work with the major life-threatening illnesses and treatment interventions. For example, chronic pain has been extensively investigated with studies of psychological correlates of response to medical or surgical treatment. Other major projects have focused on how patients cope with life-threatening illnesses and whether certain outcomes can be predicted with reference to patient premorbid personality styles. Identifying which patients will display problematic reactions to surgery or renal dialysis may enable the clinician to institute measures to counteract them and thereby diminish the likelihood of a poor outcome (Cohen & Lazarus, 1973; Abram, Note 1).

It became apparent as our search continued that there was no single best instrument or combination of instruments available to meet the varied needs of clinicians and researchers. It was the wish of the group to develop a single instrument that would serve the needs of the medical psychodiagnostician more fully. Brevity, clarity, and ease of administration were added to the goals of elucidating salient and relevant dimensions of functioning. The instrument that was developed over a 4-year span of research has been labeled the Millon Behavioral Health Inventory (MBHI).

Constructed in a manner similar to the manner of construction of the Millon Clinical Multiaxial Inventory (Millon, Meagher, & Green, Note 2), a psychiatrically oriented inventory, the MBHI was developed through a sequential process, involving theory-based rationale (substantive validity), internal consistency studies (structural validity), and empirical demonstrations of scale discrimination power (external validity) (Millon, Meagher, & Green, Note 2). In its final form the MBHI consists of 150 self-descriptive true-false items. Table 1 contains a listing and brief description of the 20 clinical scales and is divided into four major sections. In the first section are eight scales that comprise the major personality styles; these were derived as "normal" variants of personality from a theory of personality pathology (Millon, 1969). The degree to which the patient characteristically exhibits each of the eight styles is expressed in a profile pattern. The next set of six scales reflects different sources of psychosocial stressors selected on the basis of their support in the research literature as significant and salient factors that contribute to the precipitation or exacerbation of physical illnesses, for example, chronic tension and social alienation. The third set of scales was empirically derived by differentiating patients with the same physical syndrome in terms of whether their illness was or was not substantially complicated by social or emotional factors. High scorers on the allergy, gastrointestinal, or cardiovascular scales are those who are most similar to known psychosomatic patients. The fourth set has also been empirically developed. These prognostic indices seek to identify future treatment problems or difficulties that may arise in the course of the patient's illness.

Table 1: Brief Descriptions of High Scorers on 20 Clinical Scales of the Millon Behavioral Health Inventory

Scale	Description
Personality style	
Introversive Personality	Keeps to self, quiet, unemotional, not easily excited, rarely gets socially involved, lacks energy, vague about symptoms, passive about self-care
Inhibited Personality	Shy, socially ill at ease, avoids close relationships, fears rejection, feels lonely, distrustful, is easily hurt, requires sympathetic support
Cooperative Personality	Soft hearted, sentimental, reluctant to assert self, submissive with others, lacks initiative, eager to take advice, is compliant, dependent, devalues self-competence
Sociable Personality	Charming, emotionally expressive, histrionic, talkative, stimulus seeking, attention seeking, unreliable, capricious in affect, easily bored with routine
Confident Personality	Self-centered, egocentric, narcissistic, acts self-assured, is exploitive, takes others for granted, expects special treatment, is benignly arrogant
Forceful Personality	Domineering, abrasive, intimidates others, blunt, aggressive, strong willed, assumes leadership role, impatient, and easily angered
Respectful Personality	Serious minded, efficient, rule conscious, proper and correct in behavior, emotions constrained, self-disciplined, avoids the unpredictable, is orderly, and socially conforming
Sensitive Personality	Unpredictable, moody, passively aggressive, negativistic, a complainer, guilt ridden, anticipates disappointments, displeased with self and others
Psychogenic attitude	
Chronic Tension	Is under self-imposed pressure, has difficulty relaxing, constantly on the go, impatient
Recent Stress	Has experienced significant changes in previous year, life routine has been upset by unanticipated tensions and problems
Premorbid Pessimism	Is disposed to interpret life as a series of misfortunes, complains about past events and relationships
Future Despair	Displays a bleak outlook, anticipates the future as distressing or potentially threatening
Social Alienation	Feels isolated, perceives minimal social and family support
Somatic Anxiety	Is hypochondriacally concerned with bodily functions, fears pain and illness
Psychosomatic correlate	
Allergic Inclination	Is empirically similar to patients evidencing a strong psychological component associated with allergies such as dermatitis and asthma
Gastrointestinal Susceptibility	Is empirically similar to patients evidencing a strong psychological component associated with gastrointestinal disorders such as ulcers or colitis
Cardiovascular Tendency	Is empirically similar to patients evidencing a strong psychological component associated with cardiovascular symptoms such as hypertension or angina
Prognostic index	
Pain Treatment Responsivity	Is empirically similar to patients who fail to respond successfully to medical treatment regimens for chronic pain syndromes
Life-Threat Reactivity	Is empirically similar to patients with chronic or progressive life-threatening illnesses—carcinoma, renal failure, and heart disease—who display a more troubled course than is typical
Emotional Vulnerability	Is empirically similar to patients who react with severe disorientation, depression, or psychotic episodes following major surgery or other life-dependent treatment programs

Psychometric Analyses of the MBHI

RELIABILITY

Reliability of the scales of the MBHI was analyzed in two ways. The Kuder-Richardson formula (K-R 20) was used to assess the internal reliability of the scales. The K-R 20s ranged from .66-.90, with a median of .82. Test-retest was employed as another means of evaluating reliability. Eighty-nine patients were retested at intervals from 1-8 months, with a mean interval of 4½ months. Scale reliability ranged from .72-.90, with a median of .83.

VALIDITY

Comparing scales with others that supposedly measure the same trait is one traditional method of establishing validity, assuming that these other scales successfully measure the specific traits. The psychogenic attitude scales exhibit the following approximate correlations with other instruments: For Chronic Tension—Jenkins Activity Survey, $r = .60$; California Psychological Inventory Tolerance, $r = -.40$; for Recent Stress—Social Readjustment Rating Scale, $r = .65$; Personal Orientation Inventory Time Competence—Time Incompetence, $r = .45$; for Premorbid Pessimism—MMPI Depression, $r = .60$; Beck Depression Scale, $r = .60$; for Future Despair—Zung Depression Scale, $r = .55$; MMPI Psychasthenia, $r = .55$; for Social Alienation—MMPI Social Introversion, $r = .65$; Symptom Check List-90 Interpersonal Sensitivity, $r = .60$; for Somatic Anxiety—MMPI Hypochondriasis, $r = .65$; MMPI Hysteria, $r = .60$.

In addition, cross-validation samples were used to assess the validity of individual scales. Life-threat reactivity, for example, exhibited a valid positive of 75% and false positive of 12% on a cross-validation sample.

Use of the MBHI in Medical Settings

Only recently developed, the MBHI has been used in a wide variety of medical settings, serving at different times as a research instrument, a diagnostic tool, and a guide to treatment plans for patients. Generally these studies have served as pilot projects for further research efforts and are yet unpublished. Experience with the instrument suggests that it is a convenient, easy-to-administer tool, well tolerated by patients, and of appreciable value in providing relevant and useful information to members of the medical-psychological team. Although the following list is by no means exhaustive, it provides examples of how the instrument has been used in different settings.

The etiology and treatment of pain is currently an area under considerable research and clinical study. The MBHI has been employed at a number of pain centers, both as a research tool and as a means of formulating treatment approaches (Meagher, Note 3). The Pain Treatment scale appears to be particularly successful in identifying which patients are likely or not likely to respond favorably to current medical treatment.

regimens (Rabinowitz, 1979). The MBHI has been employed diagnostically in inpatient settings to develop both rehabilitation and group programs optimally suited to individual-patient strengths and weaknesses.

The MBHI has been used as a research instrument in a number of medical oncology units. One recent study involved an attempt at determining how personality and premorbid adjustment would affect the course of the illness. A study that is currently under way at a regional cancer center uses the MBHI to evaluate the relationship among pain, mood states, and the progress of cancer.

Sexual disorders are one area in which there exists strong agreement about the impact of emotional components in both the development and the treatment of dysfunction. The MBHI has been employed in an extensive study of sexual dysfunction treatment and has held up quite well as a discriminating predictor of treatment outcome (Green, 1978). The investigators of this study posited that the tool is valuable as a basis for appropriate therapeutic referrals. For example, patients with a lower probability of success could be advised to seek therapy that would address marital problems prior to engaging them in more focused sexual dysfunction treatment.

Summary

The MBHI is the first general-purpose instrument of a psychological nature designed for use in a wide range of medical settings. Relevant and brief, it may prove to be a practical tool for obtaining information on both personality in general and more specific areas of psychological concern. The instrument has been developed on a large sample of patient and nonpatient populations and has been constructed through a sequential validation process. Each of the various scales can be evaluated on its own or interpreted in conjunction with other test or biographic data. The MBHI should be seen as another step toward making the psychologist assume the role of medical psychodiagnostician more effectively.

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PSYCHOLOGICAL PREPARATION FOR THE ELITE ATHLETE

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PSYCHOLOGICAL PREPARATION OF THE ELITE ATHLETE

The generalizations that form the basis for most of the psychological principles that are now being employed to enhance motor performance have been borrowed from the more traditional therapeutic uses of behavior modification. What these principles share in common is the containment or manipulation of stress related anxiety or tension. The essential goal has been that of providing the competitor with techniques, systems or methods of attaining mastery over intrusive forms of anxiety/tension. (Meichenbaum, 1975, Wolpe, 1966). Therefore, stress management is the common element that underlies the various processes that will be reviewed for this presentation.

The specific management techniques which are now employed to modify negative or disconcerting athletic behavior that have received the most experimental attention are:

- a. muscle relaxation training
- b. autogenic training
- c. control over mental imagery
- d. active fantasy
- e. biofeedback
- f. self-hypnosis or meditation
- g. through stopping techniques, or "stop drills"

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- h. cognitive restructuring
- i. new methods of self talk
- j. imagery rehearsal
- k. utilization of coping models

These treatment modalities share a number of similar elements so that most often the chosen modification program is the result of a blending of three or more of the foregoing treatment techniques.

STRESS VS. DISTRESS FOR THE ELITE PERFORMER

During the early history of attempting to apply mental hygiene principles with athletes who were experiencing training or competition conflicts the terms "hyperanxious" or "psyched-out" were used to describe particular performance syndroms. (Ogilvie, 1963) In present day terms a more descriptive label would be hyper-arousal and hypo-arousal. These terms have reduced the possibility for ambiguity when others become a necessary part of the treatment program. Based upon recent studies of the priority needs of those coaching elite gymnasts and figure skaters problems associated with arousal ranked among the five most frequent areas of concern. There was a general concern with identifying and then maintaining the level of arousal that would compliment each performance. In terms of psychological readiness the ideal state of arousal for any given form of human performance would be defined as follows:

The individual performer has attained an emotional and intellectual state whereby, there is a totally harmonious and integrated neuromuscular expression.

The challenge for the teacher, coach and the behavioral scientist is that of determining the level of arousal that will maximize the opportunity for optimal performances.

Such a determination will rest upon a number of types of information. Some of this information can be obtained by objective methods such as the requirements of the particular event or competition. What is more difficult to discern will be the unique personality factors that operate at a subconscious level when the individual competitor places his/her talent on the line. The most frequent question posed by the coach is "how do I psych-up this athlete". The first question for the behavioral scientist is "what are the specific motor requirements of this particular event"? Once this is established then the important question becomes "what level of arousal is warranted".

The ideal level of arousal that is appropriate for optimal performance must be determined upon the basis of three important factors:

- a. the level of task difficulty
- b. the degree of mastery the athlete has attained in the required motor skill
- c. and, the innate ability of the performer.

TASK DIFFICULTY, AROUSAL AND THE FACTOR OF TIME.

The interaction of time required for performance with task difficulty will introduce many special problems in terms of how we apply the principles of behavior mastery. The nature and quality of arousal for a downhill racer whose performance is judged on the basis of hundredths of a second differs in a number of important ways from that for an international figure skater performing a five minute routine. The example of the competitive weightlifter whose performance requires only milliseconds when compared with the NBA basketball player who averages thirty-two minutes per game over a ninety-six game season. Such apparent differences in duration of performance necessitate the introduction of sports specific forms of arousal.

The most valuable hypothetical model for comprehending the relationship between task difficulty and time of performance is based upon research on human performance that was unrelated to sport.

SIGNIFICANCE OF THE INVERTED U-SHAPED CURVE FOR TASKS OF VARYING DIFFICULTY

If we chose an hypothetical index of difficulty of performance and wished to predict the effect of arousal upon the quality of performance the following generalizations would apply:

- a. for motor tasks that require refined neuromuscular skills the athlete would be trained in techniques that reduce anxiety/tension and yet still permit them to introduce appropriate arousal at the moment of demand.
- b. when the motor task requires only moderate neuromuscular skills the techniques would be that of maintaining moderate levels of arousal.
- c. for motor tasks in which the neuromuscular skills are easy in nature the preferred techniques would be that of sustaining a high level of arousal.

(Diagram U-Shaped curve here)

SIGNIFICANCE OF THE LEVEL OF LEARNING

The generalization holds that under pressure well learned tasks are better performed, while partially-learned tasks are performed more poorly.

Too often the coach's, parent's or fan's negative response to an athlete's retreat to a former level of proficiency is a failure to accept this psychological fact of life. Under the pressure of high arousal/anxiety the competitor tends to choose past techniques or response patterns which have been overlearned and safe. What is to the observer a less desirable choice, is for the performer the one that is safe and sustains their self-esteem. In such cases the only rational treatment is that of increasing the athlete's degree of mastery by programming arousal that is based upon where the athlete falls on their new learning curve.

ABILITY OF THE ATHLETE IN RELATION TO TASK DIFFICULTY

It is rarely possible to quantify human motor ability in absolute terms but in general as task difficulty increases the relative difficulty for the athlete of less ability increases disproportionately. Therefore, high levels of arousal will be more disruptive to an athlete of average ability than an elite athlete, other things being equal. This demands that goal setting be based upon a collaborative effort in which the athlete acknowledges where he/she lies on the ability continuum. Next they must accept what will be required on their part in order to attain the next level of skills acquisition.

REINFORCEMENT OF PERFORMANCE CUES

It is not possible to set performance goals unless we are certain that the athlete and those seeking to modify behavior, are responding to the same cues. The teacher can greatly aid in objectifying cues by selecting techniques that will enable the performer to identify and attend to the relevant cues.

Such techniques are important because we know that the elite athletes have conditioned themselves to attend to fewer cues, to respond earlier to cues and are able to discriminate more quickly as to what are the relevant cues.

The less-able or inexperienced performers tend to make three primary errors. They attend to too many cues or too few, to

irrelevant cues or respond too late to the cues to allow for behavioral readjustments.

Psychological inventories designed to measure and anticipate such deviations in attentional styles have proven to be of inestimable value in identifying athletes with such response tendencies. (Nideffer, 1979)

UNIQUENESS OF PERSONALITY IN RELATION TO AROUSAL, CUE UTILIZATION CONSEQUENT STRESS

It is extremely hazardous to generalize about problems of arousal without giving serious attention to, and having knowledge about the intrinsic determinants of the performers behavior. Though we may be able to make an objective analysis of the motor requirements for any given event we still may never be able to predict where, when or how performance anxiety might be expressed. Until February of this year who could fully comprehend the conscious or subconscious aftereffects of Ingmar Sternmark's serious fall during a downhill race. Only a change in the World title rules forced him to retreat from his pronouncement that he would never compete in this event again.

It remains for the behavioral sciences to continue to develop instruments and ways of identifying the deeper feelings and attitudes that become both the conscious and subconscious determinants of their behavior. Particularly how these psychological determinants generate needs that influence their percep-

tions both as performer and as persons. As is true for any medical symptom, it is often of more value clinically to know the athlete with the performance crisis, rather than the crisis the athlete has.

The interaction of anxiety and stress in terms of producing performance inhibitions can only be understood when based upon an wholistic study of the performer. Subjecting the elite athlete to psychological evaluation has provided a much sounder basis for identifying the ideosyncratic nature of performance inhibitions or crises. The employment of select personality inventories greatly enhances the reliability of exposing characterological predispositions. The illumination of habitual response patterns of a subconscious nature contribute immeasurably to the design of the final treatment or modification program. To be able to place any given competitor along a continuum with respect to any personality tendency increases the probability that the program will meet the intrinsic needs of the performer.

The objective evidence that an individual falls within the upper ten percent of the population for introversion, extraversion, guilt-proneness, resting level of tension, depression-proneness, impulsivity or perceptual rigidity each may contribute to the design of the modification program. As reported previously this investigator has found value in determining some thirty

such response tendencies. (Ogilvie, 1963, 1972).

IMPORTANCE OF THE SOCIAL HISTORY

As reported previously the clinician seeking to provide service to the elite athletic population is always functioning under the pressure of time. Often the competitor does not seek intervention or is not referred by the coach until the crisis or inhibitions is so blatant that the athlete's career is in jeopardy. Usually there is an impending competition and an urgency to return the athlete to competitive training as quickly as possible. (Ogilvie, 1979) The pressure of time, the availability of the performer and the need to introduce the best possible treatment program places limits upon the opportunity for the desired social history.

This causes considerable consternation when counseling the youthful U.S. team members during their training at national camps. One crisis generating social factor has been the presences of parents either during critical phases of training or during actual competition. When they find a professional they can trust a significant number wish to explore why their performances deteriorate when one or both parents are present. Their desire is to find a strategy that would discourage the parent's attendance and still not cause the parent to feel rejected.

When we are dealing with children whose parents are making enormous financial, social and time sacrifices in order to maintain the child in an elite training program this is a crisis that must be handled with unusual delicacy. Once the child has attained regional or national recognition the factor of vicarious parental satisfaction through the child's achievement must be treated with great sensitivity.

There will be a select number of youthful competitors who express the opposite problem and wish to find ways to encourage one or both parents to take a more active interest in their accomplishments. The threat imposed by either of these extremes may seem incidental, but they do in fact contribute to a number of forms of performance anxiety.

The intrusive parent creates feelings of resentment, anger or that of being exploited which can produce an exaggerated level of arousal which can negate fluid performance. To underlying negative feelings are transmitted neuromuscularly into some specific organ or body system.

The absentee parent generates stresses that contribute to feelings of apathy, self-doubt and moodiness. These youthful competitors express a desperate need for recognition and acceptance from their parents in order to continue to concentrate on the demand of training. There is a strong

tendency for many who are responsible for the development of such athletes to reject such needs when expressed by an adolescent performer. Once again we must be reminded that for any given sample of children social, psychological and physical maturity proceed at different rates and that chronological age has only limited value in making our judgments. (Ogilvie, 1979)

VALUE OF THE CLEAR CUT NATURE OF THE CRITERIA FOR SUCCESS

One of the special advantages of working with the elite performer is that there is little time lost searching for the problem. The actual performance crisis event can be described in precise terms using behavioral examples which are clear and to the point. The downhill racer retains total recall with respect to actual performance, the pitcher can report with accuracy every pitch thrown during a nine inning game. Many claim to have total recall for an entire season. Although there is no research evidence to support such claims such statements are consistent with this investigators observations. It does appear that the elite athlete has developed a special faculty for retention of motor memory. This general view is held in reference to their greater body awareness and possible superior motor intelligence. (Clein, 1978)

Interacting with this high level of motor awareness is typically a high level of motivation to do whatever is neces-

sary to change negative patterns. Once the inhibition or performance decrement has been verified by the athlete then the collaborative process to bring about change can begin. The process usually takes this form:

- a. statement of the problem
- b. acceptance of the problem
- c. acceptance of possible causes underlying the problem
- d. ordering the strategies in terms of best solution
- e. attacking problem on the basis of collaborative judgment as to best solution.

As is true for all human conflict the cause is rarely unidimensional but will be found as an interaction of human experiences. The fourteen year old racer who develops a mild depression because as she states "I feel so guilty for letting my coach down by failing to win" has been well schooled in order to so respond. The causes for this particular attitude are multiple in nature and are the result of a wide range of social reinforcement within her early environment. Therefore, the exploration of possible underlying causes must precede the determination of the appropriate strategy.

THE SIGNIFICANCE OF THE PRESENTING SYMPTOM

As stated previously the athlete during the initial interview is able to describe in precise terms what they feel to be at a conscious level "the problem". The professional

pitcher can relate the fact that he continues to lose his control after the third inning, the downhill racer can relate the fact that he has failed to qualify for the finals during the last seven professional races, the figure skater can tell you that during international competition she failed to include two required moves even though she had been practicing them for six months. Whatever the sport the athlete can relate the reality of personal failure.

Each performer when confronted with this reality will express a near universal form of anxiety/tension which follows directly from a profound sense of loss of control. This can ultimately lead to the most destructive response patterns even in the most gifted athlete which is best understood as "motor ambivalence". Once an athlete has attained the level of skill where the required motor response is best expressed at a subconscious level the introduction of feelings of self doubt always leads to some form of conscious interference. The motor ambivalence is expressed by second-guessing, negative thinking and derogating self-talk which invariable causes an interference with the overlearned free flowing coordinated neuromuscular responses.

Before we can fulfill the requirements of "step c" in the process of change we must determine the exact moment and the

nature of the negative intrusion. The precipitating cause is best illuminated by identifying the specific onset of intrusive bodily tension. Through the clarification of the feelings, events and mental associations which preceded the buildup of bodily tension the program for introducing better control is formulated.

There are of course, a number of other important clinical insights that will form the basis for any treatment program such as:

- a. was the intruding emotion or feelings specific to this event.
- b. is the performance decrement related to former habitual response patterns
- c. the specific form in which the athlete internalizes the anxiety when threatened with a loss of control.

The value of early recognition and treatment of performance related crises cannot be over stated. It is axiomatic in sport as it is in general clinical practice that the earlier the intervention process is introduced in relation to the trauma the better the prognosis. Once the athlete begins to marshal his defenses in order not to suffer a reduction in self-esteem the complexity of the problem increases and the time necessary for the irradiation of the problem greatly increases.

The treatment program employed, as well as the techniques

selected on an individual case basis have the three basic goals:

1. the containment of irrational fear
2. the redefinition of physical and mental positive cues
3. the reinstitution of feelings of control or mastery.

SUMMARY OF A CASE HISTORY

This case history is presented in order to amplify select points in the foregoing discussion and to reinforce once again the necessity for retaining a wholistic view of the performer in crisis.

The presenting problem of this 27 year old professional downhill racer was his inability to place higher than 7th place during the previous year of competition. His achievement ranged between 7th and 17th which he felt was not truly representative of his ability. It was fortunate that even during the first interview that he was able to expose a most fundamental negative attitude. His expressed feeling that he has been totally betrayed by a number of important people in his life proved to have enormous clinical value.

The results of his psychological tests contributed most to understanding many of the emotions and attitudes he brought to competition. Of particular value was the extent to which he differed in personality when compared with other elite males.

In terms of his general emotional state he would best be described as experiencing an anxiety-neurotic reaction with depressive features. Whenever such a case history is presented the question of the ethical responsibility of the behavioral scientist always becomes a topic for discussion. In such cases the athlete is informed as to the implications of the psychological findings in terms of his long term mental health. He is then offered a choice of seeking professional help for the more basic underlying problem or working specifically upon the sport related problems. A list of therapist within his community is given should he choose the former course of action.

It may be of some interest to note that in this clinicians experience during the past twenty-seven years that positive changes in performance has invariably been associated with positive changes in general social behavior.

INTERVENTION PROCEDURES

The personality trends that provided the most significant information with regard to designing best intervention strategy were as follows:

1. His resting level of bodily tension placed him at the extreme negative end of the scale when compared to successful athletes.
2. He had an extreme need to internalize deep feelings of guilt when he failed to meet his goals.

3. He had an almost complete loss of faith in others.
4. He expressed an almost complete loss of emotional control when things were not going well in competition.
5. He had a strong tendency to have mood swings without any apparent cause.
6. He was able to identify the specific areas of bodily tension as they related to competition.
7. He was able to describe precise changes in physical skills when things were not going well.
8. He was able to label the change in his mental processes whenever he experienced a reduction in performance skills.

The first step in devising a treatment program was to instruct him in the use of relaxation drills. Once he had attained a high level of proficiency in his capacity to induce total relaxation this state was used to purify his creative imagery. Through this process it was possible to reexperience the relevant performance behaviors and to validate the actual emotional or feeling tone that accompanied the motor event.² This made it possible to recapture the precipitating stimuli that contributed to the crisis.

Most athletes can be trained to project on an imaginary screen the actual behavior and feelings associated with the performance skill as though they were rerunning a stored tape in their head. This technique permits the performer to develop a conscious awareness of both the physical and emotional components that usually only function at a subconscious level.

Essentially what is achieved is mastery over an extremely effective stress management technique which offer the individual a sense of control over their feelings.

An extensive review of this athlete's competitive history made it quite evident that he characteristically psyched himself out before the actual event. He consistently achieved a level of arousal preparatory to the event that he suffered serious energy depletion and was in a state of physiological decline as he left the starting gate. There had been occasions where his level of arousal was so elevated that he left the starting gate in almost a spastic state.

A necessary part of the program became that of reeducating him in the recognition of both the mental and body signs of arousal. It was particularly important to have him recapture his "self-talk" that occurred during times of unusual stress.

Training in the conscious recognition of his specific body or body system tensions that were associated with his varying states of arousal became the cue or signal for him to induce autonomic control. The signal for this athlete that he was losing his capacity to maintain appropriate arousal was hypertension in his neck and shoulder, followed by intestinal discomfort.

Once these relationships were established as the most

predictive signs of inhibiting or disruptive forms of tension he was trained in the utilization of "stop drills". Thought stopping drills combine a number of stress management procedures, the most valuable are autogenic training, mental imagery control and self-talk.

Though the steps seem direct and simple the induction of these processes demands a sensitive insight into the cognitive structures which form the basis for the meaning of any given verbal signal. To expand upon this fundamental issue would require a separate paper, essentially what is inferred is the distinction between denotative and connotative meaning. In programming behavioral change the clinician must be able to seek the "metameaning" or the feeling meaning that accompanies the verbal association when the athlete engages in self-talk. (Hayakawa, 1979, Osgood, et.al. 1957) In order to reinforce the appropriate emotion that will compliment more effective neuromuscular control the language must be a valid representation of the athlete's feelings. It is never possible to assume what the association value for any given verbal symbol is for the performer.

Once feeling validity has been established the competitor is then trained in the use of mental rehearsal techniques. This provides the athlete with the opportunity to select the

words and language that will extinguish negative thoughts or associations and to reinforce positive verbal self-talk.

The following treatment procedures formed the basis for behavior modification of our troubled downhill racer.

1. training in the induction of total relaxation, the method of contrast drills was employed.
2. he was instructed in the utilization of autogenic training once he had mastered the induction of the relaxed state.
3. he was trained to master positive imagery and to use new positive associations to complement his motor behavior.
4. he was instructed in the use of visual rehearsal as a valid means of reinforcing proper motor behavior, also as a technique for preconditioning those behaviors that were essential for peak performances.
5. these and other modification techniques were then practiced by simulating actual competition or training on the mountain.
6. refinements were introduced on the mountain as he experimented in order to find the ideal emotional and physical set for optimal performance.

The problems presented by his habitual reversion to self-depreciation, and self-derogation whenever he failed to live up to his high standards did not disappear immediately. The success of other aspects of the treatment program. Such levels of intropunitiveness are quite common among the elite performers who have been successful. Such subconscious self-punitive are embedded in the personality.

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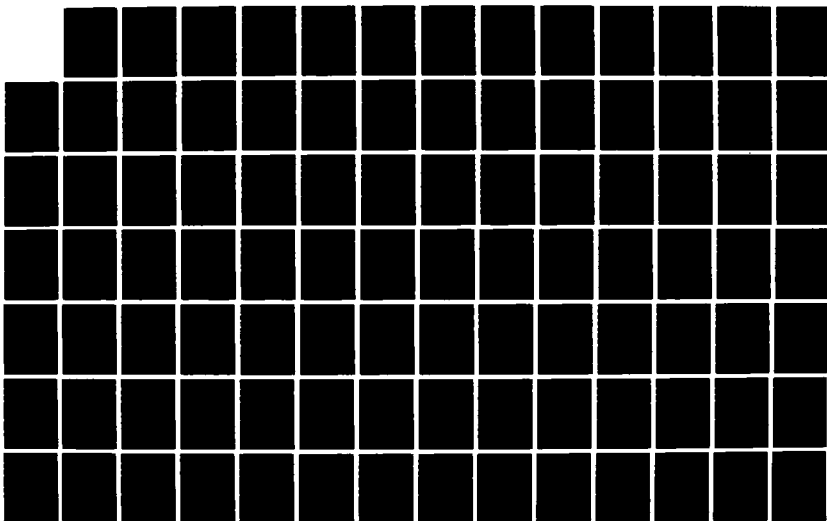
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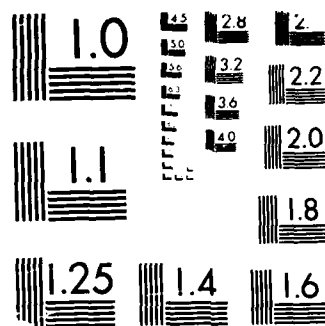
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MICROCOPY RESOLUTION TEST CHART
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influences of specific forms of early social conditioning. The sport specific modification program can reduce such tendencies but a more prolonged type of counseling is necessary if we wish a more general change in behavior.

SUMMARY

An attempt has been made to describe in the briefest terms the implementation of cognitive behavior modification principles for sports specific crises. The techniques that derive from these principles are those which have a history as effective treatment procedure for general phobic reactions and other irrational fears.

It is this clinicians opinion that the prognosis for positive change is greatly enhanced because of certain special attributes of the elite performer. First is the extreme level of motivation they bring to any program, second is the objective criteria against which to evaluate change and third is the greater sensitivity they already possess with respect to body awareness. Their obvious higher level of aspiration and past experience with success generates an urgency to continually attack the problem. In most cases there is an imposed time pressure of impending competition which forces a confrontation with real issues in the conflict. The advantage of being present during training or competition cannot be under-

stated. In such settings it is possible to validate clinical impressions. This lends itself to an increased objectivity and greatly enhances the probability that the treatment program is the result of a collaborative effort.

One fundamental truth with respect to the wholistic nature of human performance should be mentioned. And that is whether the refined motor performance is that expressed by the surgeon, the musician or the elite athlete there should be a harmony of feelings and neuromuscular performance. The scalpel, the violin bow are each incapable of distinguishing between good and bad feelings. Each performer therefore, must take personal responsibility for increasing their level of awareness. Positive thinking is a first step, but positive emotion is more fundamental if we are to approach peak performances.

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PSYCHOIMMUNOLOGY AND AIDS

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A Biopsychosocial Approach to AIDS

The Acquired Immune Deficiency Syndrome (AIDS) and AIDS spectrum disorders have emerged as perhaps the most critical public health problem of the 1980's. While a great deal of effort has been devoted to biomedical research on AIDS etiology and treatment, there is to date no known cure and no known vaccine for AIDS. This situation has led to a search for "co-factors" in AIDS onset and progression.

The biopsychosocial model of disease, credited to Engel,³ is multifactorial, taking into account the interaction of genetic, biological (specific and non-specific), emotional (state and trait), behavioral, situational ("stress"), and cultural factors in pathogenesis of all disease, not just those classically considered "psychosomatic." Given a particular genetic composition and/or physical exposure to a disease agent, a number of environmental factors can modify the host's basic immunocompetence to produce a temporarily enhanced immunity or acquired immunodeficiency. Perhaps the most prevalent but least understood of the environmental modulators of human immunocompetence are behavioral or psychosocial factors.

Because of our increasing understanding of the immunology of AIDS, as well as its relatively rapid disease progression involving infection and/or neoplasia, AIDS, for all its tragedy, may be an ideal laboratory to investigate psychoimmunologic relationships. The term psychoimmunology, coined by Solomon in 1964,⁹ refers to psychological influences (experience, stress, emotions, traits, and coping) on immune function and on the onset and course of immunologically resisted or mediated diseases. It is the conviction of our research team, the University of California Biopsychosocial AIDS Project (UCSF-BAP), that a biopsychosocial approach to AIDS research is necessary, and that research questions emanating from the fields of health psychology, behavioral medicine, and psychoimmunology/psychoneuroimmunology may provide critical information for understanding and treating AIDS.²

In this paper, we will consider areas of research that provide appropriate points of departure for psychoimmunologic investigations of AIDS. (The neurology and neuropsychology of AIDS is a complex area of intense recent investigation; a

consideration of this work and of psychoneuroimmunologic approaches to AIDS research goes beyond the scope of this paper). Evidence from our own investigations in UCSF-BAP will be presented for each of these areas. It should be emphasized, however, that because of space limitations, we are able to cite or review only a few of the many studies in this area by other investigators.

Psychosocial Factors in the Progression and Outcome of Cancer

It is difficult to compare the results of studies in psychosocial oncology because they typically focus on different types of cancer, different levels of severity, different measures, and different follow-up periods.¹⁴ However, there appears to be a thread running through all these studies concerning expression or report of emotion or distress, particularly as it relates to adjustment to cancer. Congruencies across studies, both prospective and retrospective, have prompted a number of investigators to posit the existence of a cancer-prone personality style that at least two teams of investigators have labelled "Type C."

Findings by Temoshok et al.¹³ suggest that certain psychosocial factors reflecting a theoretical "Type C" coping style are associated with unfavorable prognostic indicators for cutaneous malignant melanoma. "Type C" characteristics (e.g., being passive, appeasing, helpless, other-focused, and unexpressive of emotion, particularly anger) were theorized to be the opposite of "Type A" characteristics (e.g., being aggressive, impatient, self-involved, and hostile). Lack of emotional expression is hypothesized to be the pathological core of the Type C style. We recently found that measures of more emotional expression were positively correlated with a prognostically favorable host immune factor and negatively correlated with prognostically unfavorable tumor factors.¹⁰

Solomon's notion of an "immunosuppression-prone" personality⁸ shares common features with the "Type C" coping pattern. Related concepts include McClelland's "inhibited power motivation"⁷ and "alexithymia," which is thought to be related to somatic rather than psychological manifestations of emotional conflict.¹ Common to all these proposed patterns are compliance, conformity, self-sacrifice, denial of hostility or anger, and non-expression of emotion.

We hypothesized that similar psychosocial factors may be involved in the progression and outcome of AIDS. We are examining the relationship of length of survival to psychosocial factors assessed soon after diagnosis, and then at three, seven, and 15 months later in homosexual men with AIDS, and at parallel time points (except for the three-month assessment) for men with ARC. Based on our studies of malignant melanoma, we hypothesized that men with shorter versus longer survival times will be characterized by less emotional expression and higher social desirability scores (i.e., more "Type C"). Such studies are extremely difficult to carry out, however, because of the large number of variables that may affect outcome either independently or in interaction with psychosocial factors. Some of these variables include: the type, number, and severity of opportunistic infections at entry into the study; the type and number of medical or other interventions; possible reexposure to the Human Immunodeficiency Virus (HIV) or exposure to different HIV strains; and behaviorally related factors such as intravenous drug use, nutritional adequacy, or level of cooperation with medical regimens.

"Hardiness," Distress, and Health

Kobasa and her colleagues have produced an impressive array of studies providing evidence for a buffering effect of a personality style they call "hardiness" on stress and consequent stress-related illness.⁶ According to these authors, hardiness has three components: control, commitment and challenge. People low in control tend to feel powerless in the face of overwhelming forces. They have the "helpless-hopeless" attitude associated in an increasing number of studies in both humans and animals with poor health outcomes. Commitment is the opposite of alienation, according to Kobasa et al.; people high on this dimension find meaning in their work, values, and personal relationships. People high on the challenge dimension interpret potentially stressful event as challenges to be met with expected success, rather than as threats.

Psychological distress may be interpreted as an indicator that psychological coping, defenses, or resources (including personality style) have failed. We found that Kobasa's Hardiness scale was the best negative predictor of psychological distress

(assessed by the Taylor Manifest Anxiety Scale, Beck Hopelessness Scale, and negative affect scales on the Profile of Mood States) among men with AIDS and ARC.¹¹ In addition to its negative psychological implications, heightened distress has been found to be related to poorer medical outcomes in patients with cutaneous malignant melanoma,¹⁰ to greater morbidity and mortality in certain distressed populations in epidemiologic studies, and to decline in immune function in a variety of subject groups.⁴ Based on this accumulating evidence, we hypothesized that persons higher versus lower on scales of psychological distress would have relatively worse outcomes, while persons higher versus lower on Hardiness would have relatively better outcomes. We will be able to test this hypothesis in our NIMH-sponsored longitudinal psychosocial study of AIDS and ARC, and in a second NIMH longitudinal psychoimmunologic study of men with ARC, which aims to link psychosocial measures with immunologic parameters as well as with medical outcome. Again, however, such analyses would have to control for medical and biologic variables that may affect outcome independently or in interaction with psychological variables assessed at the same time.

Social Support

For over a decade, social support has been posited to play a significant role in health and illness. In recent years, however, several critical reviews have tempered the enthusiasm among social scientists for social support as either a causal agent or a powerful buffering mechanism in disease morbidity and mortality. Nonetheless, there is a general consensus that social support has both theoretical and practical importance as a health-related resource. Further, there are several recent studies, e.g.⁴ in which aspects of social support have been related to immunologic measures.

In the UCSF-BAP longitudinal psychosocial study of AIDS and ARC, we found that for both persons with AIDS and ARC, the more available social support were perceived to be, the less hopelessness and depression were reported.¹⁵ Social support measures were the most consistently and strongly correlated with higher scores on the Commitment subscale of Kobasa's Hardiness Scale.¹⁵ Again, to the extent that distress may have negative health implications, as discussed above, positive social support (or

its perception) may be a factor contributing to better medical outcomes than might be expected on the basis of biological prognostic indicators alone.

Linking Psychologic and Immunologic Factors to Outcome

There are no published studies of which we are aware that relate psychologic and immunologic variables to disease outcome variables (although many have been proposed and some are currently underway). Possible reasons for this include (a) the expense of conducting adequate immunologic tests, (b) the unknown temporal relationship between an external stressor, behavior, or intrapsychic event and immunologic reaction, (c) the usually unclear causal relationship between immunologic events and disease outcome, and (d) the typically long delays in prospective or longitudinal studies between psychologic testing and outcome--disease initiation, progression, or death.

UCSF-BAP has recently completed an intensive psychoimmunologic study of survival and AIDS.¹² While the prevalent belief among the general public, persons with AIDS, and even the professional community is that AIDS is invariably fatal, there is a growing number of individuals who are alive and well three, four, and even five years after an AIDS diagnosis. Our aim in this study was to look intensively at the exceptional AIDS "survivors" in order to understand how they are different from others who have a more expected course of disease.

Another important aspect of this present study is to understand the complex interactions among emotional expression, autonomic activity, and immune measures in persons with AIDS. Our interest in psychophysiological variables was prompted by a previous study,⁵ which found that malignant melanoma patients were significantly more "repressive" in style, i.e., tended to respond to potentially distressing stimuli with elevated skin conductance responses, relative to baseline, in conjunction with a decreased self-report of perturbation, in comparison to control subjects and to cardiac disease patients, who manifested the reverse pattern. To the extent that behavior, including emotional expression or suppression/repression, has autonomic nervous system concomitants, it will affect immune function, and consequently, immunologically-mediated diseases such as AIDS. In the "AIDS survivors" study, we will be able not

only to compare psychological, emotional, psychophysiological, and immunologic variables in the exceptional AIDS survivor and the AIDS patient who has an average course of disease, but we will be able to assess--ultimately--the prospective relationship of these variables to length of survival for all our subjects, who will have medical follow-ups until death (or interim follow-up data analysis). Such a study may provide important clues as to why some AIDS patients survive longer, even when biological and treatment variables are comparable. These clues can then form the basis of a biopsychosocial intervention study. Such a study may also provide a step in the understanding of mediators of relationships among cognitive, emotional, autonomic, and immunologic phenomena.

Comment

We believe that AIDS as a multifactoral disease offers a unique opportunity to explore the relationships among psychological, immunologic, and health outcome variables. Certain underlying uncertainties affect all research which attempts to explore relationships between psychosocial and immune variables. Problems are compounded by effects of disease processes themselves on the immune system, particularly in the case of a disease whose agent is "lympholethal." Certain diseases, including cancer, and infections (particularly viral) are both immunosuppressive and psychologically distressing. It is difficult to distinguish "direct" from indirect, psychologically-mediated effects.

Other problems are of particular relevance to psychoimmunologic studies of AIDS. Such studies need to take into account sexual and drug use histories (semen and many recreational drugs are immunosuppressive), as well as medical and other interventions that may also affect the immune system. In our current state of knowledge about immunology and AIDS, it is unclear whether a certain level of a parameter is "good" or "bad" in terms of a person's overall state of health and/or AIDS prognosis. For example, it is widely assumed that more Natural Killer (NK) cell activity is "good" in terms of its prognostic significance. However, NK cell activity indicates that the immune system has detected something to be destroyed; the presence of that virus or

tumor cell may be interpreted as "bad." The popular idea that psychosocial intervention may be employed for "immunoenhancement" must be tempered by recognition of the extraordinarily complex nature of the immune system, and that such "enhancement" will most certainly not occur across all immunologic parameters.

There are a number of potential problems that plague psychoimmunologic AIDS research that relies largely on correlations. It is probably naive to suggest that a significant association means that a given psychosocial measure somehow influenced a particular immunologic measure, even if the psychosocial measure was obtained at a point prior in time to the immunologic measure. First, there is the possibility that a third, fourth, or fifth variable underlies both the psychosocial and immunologic measure. This is a problem in studies that have limited--prematurely--the number of psychosocial and immunologic variables. Second, it is difficult to interpret what a significant correlation means. Let us say that psychosocial measure "X" was found to be positively and significantly associated with the number of helper (CD4) T-cells, the component of the immune system most immediately targetted by HIV. The total number of helper T-cells is probably best interpreted as an indication of the overall state of a person's immune system as it confronts HIV, and is a function of a variety of host, viral, and constitutional factors. It is unlikely that X is either directly or causally related to total number of helper T-cells. If X influences any aspect of the immune system more directly, it would probably be a compensatory mechanism. For example, a person who has a low helper-suppressor ratio typical of advanced HIV disease may be doing relatively well and without opportunistic infection. This person's state of relative good health may be mediated by another component of the immune system that may be compensating for the depleted number of helper T-cells.

More generally, we need to apply what is known in the field of immunity to some basic issues in order to understand the psychosocial correlates of immunopathology and disease, and to be convinced that these associations are meaningful. A major problem is timing of assessment of immune variables in relationship to the psychosocial variables. What is the "lag" between the presence of a psychological state and its

influence upon an immune function; or conversely, what is the "lag" between a particular immunologic aberration and psychological state? Does it not seem likely that such "lags" vary among specific aspects of immune function? What specific aspects of immune function are most relevant to health? What homeostatic adjustments may compensate for insults or defects? At this point in psychoimmunologic research on AIDS, or indeed, any disease, there are many questions and virtually no answers. We believe, however, that by posing some of these questions in the context of previous work in psychoimmunology and our own preliminary findings, other researchers may be stimulated to approach this research frontier.

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Risk Factor Analysis on
Smoking and Nonsmoking Students
at the U.S. Army Sergeants Major Academy

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ABSTRACT

Screening was conducted on 901 males in the rank of E8 and E9 who were attending the United States Army Sergeants Major Academy. Data collected included smoking histories, blood pressure, cholesterol, triglycerides, glucose, cardiovascular history, EKG, percent body fat, and body weight. Approximately 20% of subjects qualified as having hypertension as defined by World Health Organization criteria. A clear relationship was established between elevated blood pressure and heavy smoking. Percent body fat was also associated with smoking status. Smokers were more likely than nonsmokers to have a positive cardiovascular history and an abnormal EKG. The results of this study confirm the findings of others that the adverse consequences of cigarette smoking may be seen in healthy, relatively young adult males, prior to the onset of any symptoms or signs suggestive of disease processes.

Risk Factor Analysis on Smoking and Nonsmoking Students
at the U.S. Army Sergeants Major Academy

The Surgeon General of the United States reported that cigarette smoking is the chief, single avoidable cause of death in our society and the most important public health issue of our time. Estimates suggest that over one thousand people per day in the United States die premature deaths of smoking related causes. Illnesses associated with smoking include cardiovascular disease, a variety of forms of cancer (lung, larynx, oral, esophageal, bladder, kidney, pancreatic, stomach, and uterine cervix), and chronic obstructive pulmonary disease. After individuals develop one of these smoking-related diseases, they frequently discontinue use of tobacco and admit to the impact its use has had upon their health. More than 35 million Americans have discontinued smoking since the Surgeon General published his first report on its health consequences in 1964. Many millions of other Americans, however, continue to smoke. Estimates suggest that 30 to 35 percent of adult Americans and 50 to 55 percent of Army noncommissioned officers smoke. This represents a significant increase over the incidence of smoking in the adult population and is an issue of serious concern to the Secretary of Defense and his Deputy Secretary of Defense for Health Affairs.

A dilemma for health care providers and researchers is the massive denial which many smokers demonstrate. The diseases associated with smoking develop as a result of progressive changes in the body that occur over time. The dose response relationship between smoking behavior and disease onset is clearly established. Unfortunately, many Americans accept absence of evidence of a disease as evidence of absence of the disease.

This study analyzed the smoking behavior and associated variables of healthy, noncommissioned officers attending the United States Army Sergeants Major Academy at Fort Bliss, Texas. These soldiers will be the senior Army, Navy, Air Force, and Marine Corps noncommissioned officer leaders of the next decade. They were not patients seeking medical treatment. They were and are supposed to be physically fit, healthy, adult military leaders. The evaluation was conducted as part of their program of study.

METHOD

Subjects were 901 males in the rank of E8 and E9 who were selected for attendance at the United States Army Sergeants Major Academy. Screening was done during inprocessing to the academy. One day was set aside for the students to provide demographic data, provide smoking histories, and receive evaluation of a variety of factors to include blood pressure, cholesterol, triglycerides, glucose, cardiovascular history,

EKG, percent body fat, and body weight. The data in this report represent four classes of students seen during a two-year period. Blood pressure recordings were not available for the first class (approximately 250 students) who were evaluated with this screening procedure.

RESULTS AND DISCUSSION

The majority of the subjects were white (67.8%), with 21.8% black, 5.6% Hispanic. Approximately 10.8% reported a positive cardiovascular history. They averaged 39.6 years in age (range = 25 to 55). The average blood pressures were 129.1/82.7 mm. Hg. (range = 90-210/50-126 mm. Hg.). Approximately 20% qualified as having hypertension as defined by World Health Organization criteria. Almost none of them were receiving treatment for hypertension.

The average cholesterol and triglyceride recording were 218.9 mg/DL and 136.4 mg/DL, respectively. The average percent body fat was 22.3 (range = 12 to 35).

Approximately 45.1% of the subjects did not smoke, 33.4% smoked a pack a day or less, and 21.6% were considered heavy smokers (more than 1 pack per day). A clear relationship was established between blood pressure and heavy smoking. Heavy smokers were significantly more likely to have increased systolic and diastolic blood pressures than pack-a-day smokers or nonsmokers.

A relationship was also demonstrated between per cent body fat and smoking status. Regression equations suggested that cigarette smoking has an effect on per cent body fat. Nonsmokers demonstrated a gradual increase in per cent body fat with age. This was not true for heavy smokers. As has been reported by others, cigarette smoking appears to be associated with thinness and reduced body fat. It is unfortunate that cigarettes may help produce a body image desired by many and assist soldiers in complying with Army weight standards. The thinness that cigarettes promote is not one associated with good health.

Cigarette smoking was also found to have a significant relationship with the probability of having a positive cardiovascular history and an abnormal electrocardiogram. A clear dose response relationship was established for these factors.

Regression equations were developed for the relationship between smoking status, age, and serum cholesterol. The results obtained suggested an increasing serum cholesterol in smokers with age as contrasted with nonsmokers, but these results do not reflect a dose response relationship. Light smokers were most likely and nonsmokers most unlikely to show an increase in cholesterol with age. Heavy smokers, on the other hand, fell in between these two groups.

The results of this study confirm the findings of others that the adverse consequences of cigarette smoking may be seen in healthy, relatively young adult males, prior to the onset of any symptoms or signs suggestive of disease processes. None of the subjects in this study were evaluated because of physical or medical complaints. A clear dose response relationship was established with a variety of factors to include elevated blood pressure, abnormal EKG, positive cardiovascular history, and per cent body fat to demonstrate some of the deleterious effects that tobacco appears to be having on these individuals.

These men represent the senior noncommissioned officers who will be expected to lead in the nation's defense during the next 10 years. One cannot look at these data without wondering about the ability of the smokers sampled to do this. At what cost to themselves and to the nation do these men smoke? How much is their capacity to lead and fight diminished by their smoking behavior?

Cigarettes Smoked/Day*

	<u>N</u>	<u>%</u>
None	272	45.1
0-10	36	6.0
11-20	165	27.4
21-30	39	6.5
31-40	53	8.8
41+	38	6.3
	<u>603</u>	

Sex: All males

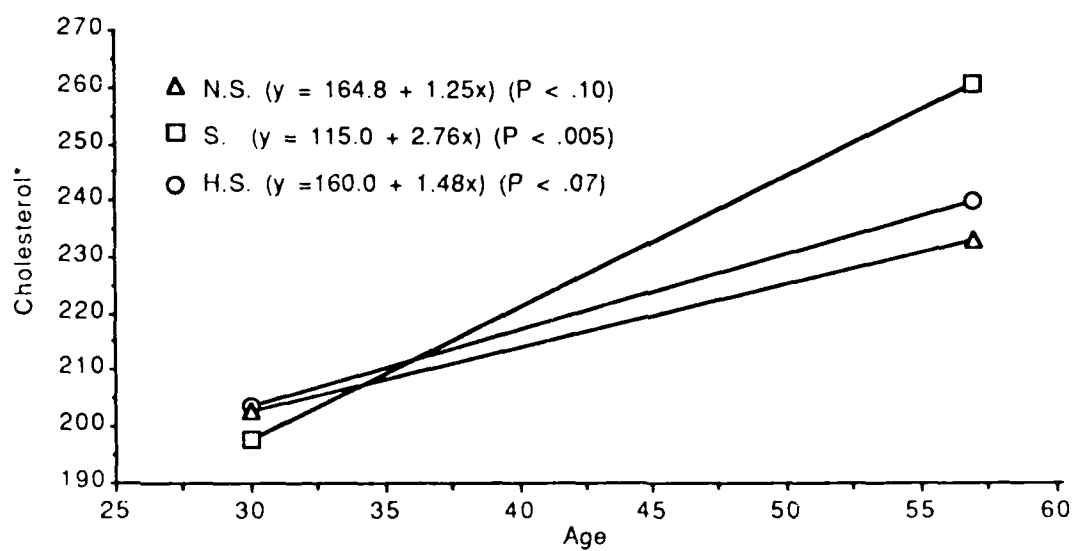
Rank: E-8,9

Race: 67.8% White
21.8% Black
5.6% Hispanic
4.9% Other

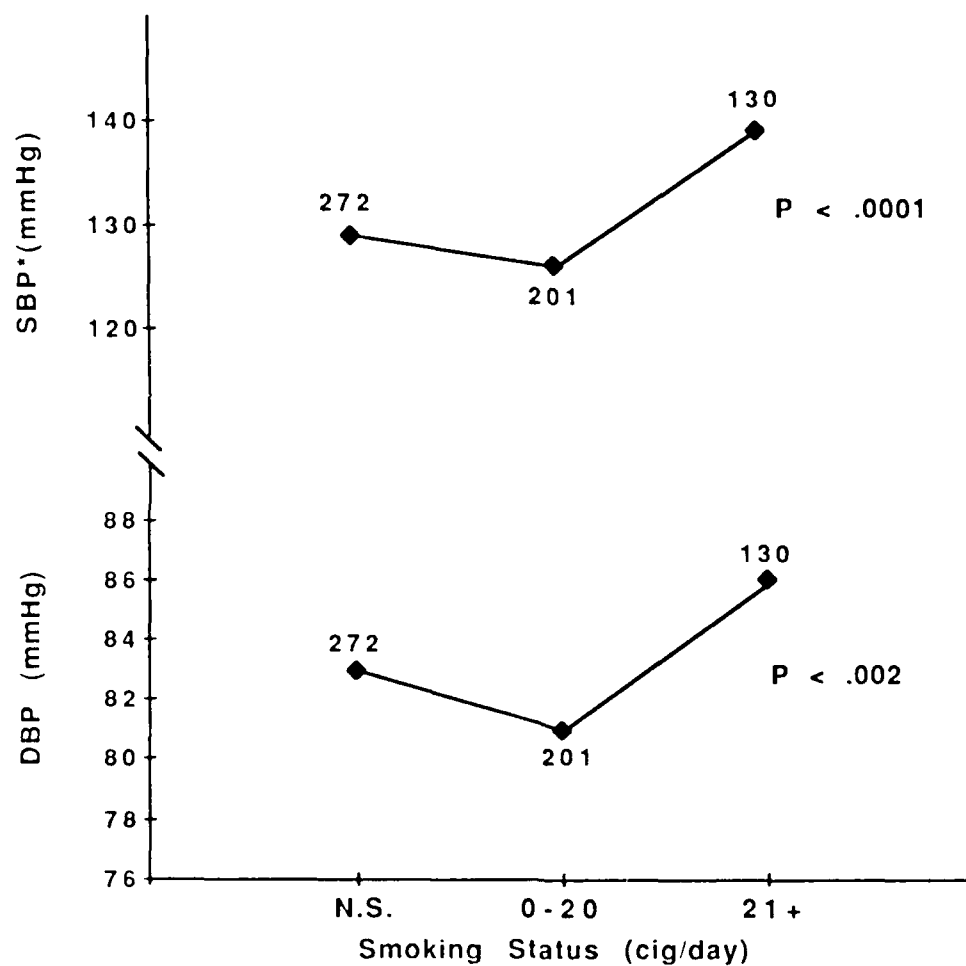
Cardiovascular Hx: + 71
- 586

USASMA (data set #1): Overview

	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>Min</u>	<u>Max</u>
Age	742	39.6	3.6	25.0	55.0
SBP	660	129.1	21.1	90.0	210.0
DBP	660	82.7	12.7	50.0	126.0
Chol(1)	893	218.9	42.1	92.0	389.0
Trgl(1)	894	136.4	90.1	28.0	810.0
Glu(1)	901	89.0	29.8	29.0	840.0
% Body Fat	739	22.3	4.0	12.0	35.0



*USASMA (data set #1)



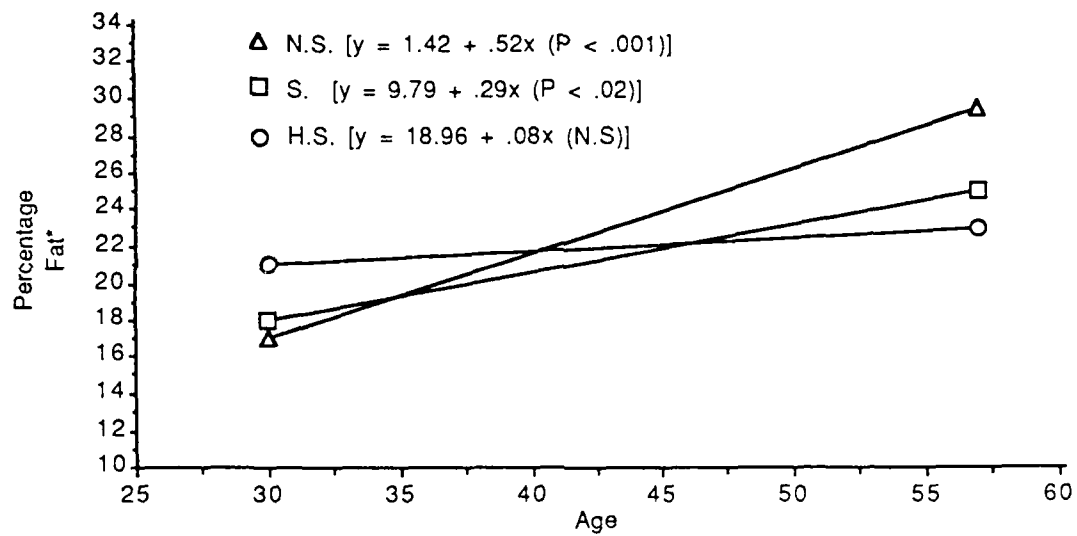
*USASMA (data set #1): N = 603

		Cigarettes/day*		
		0	1-20	21+
EKG	N	249	177	97
	A	21	19	32

*USASMA (data set #1)
P < .0001

		Cigarettes/day*		
		0	1-20	21+
CVH	(-)	254	175	96
	(+)	16	21	33

*USASMA (data set #1)
P < .0001



*USASMA (data set #1)

Patterns of Relationships Between the MMPI and the Basic Personality Inventory

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Abstract

The Basic Personality Inventory (BPI, Jackson, 1976) is a 12-scale, 240-item, true-false measure of psychopathology. It was constructed to be used in clinical and counseling settings. The 12 constructs measured by the BPI are the following: Hypochondriasis, Depression, Denial, Interpersonal Problems, Alienation, Persecutory Ideas, Anxiety, Thinking Disorder, Impulse Expression, Social Introversion, Self Depreciation, and Deviation. One hundred and sixty-five individuals who sought psychological assistance at Army mental health facilities were administered the BPI and the MMPI. The purpose in administering these instruments together was to evaluate the relationship between them. The results of this investigation supported the validity of several of the constructs included in the BPI. These results will be more thoroughly discussed below.

Measuring psychopathology is an integral aspect of the work performed by clinical psychologists. To aid in this endeavor psychometricians have developed numerous measures of human behavior with specific reference to the variety of

psychopathology encountered in clinical settings. In the development of various measures of psychopathology, it is necessary to establish the validity of the instrument. Validity is established in several ways. Examining developmental or age-related differences, discerning differences between sample groups, and establishing the relationship between measures of similar constructs are some of the more common means employed to establish the validity of a measure of psychopathology (Cronbach and Meehl, 1955).

When the relationship between two dissimilar measures of identical constructs is evaluated, information is obtained on the basis of convergent validity of the constructs in question. Campbell and Chun (1977) and Hundleby and Connor (1977) suggest such an endeavor provides important information about the instruments under scrutiny. The clinical investigator is able to discern the extent of redundancy or independence among the instruments. The first purpose of the present paper was to examine the relationship between the MMPI and the Basic Personality Inventory (BPI, Jackson, 1976). Both instruments are purported to be multi-dimensional measures of psychopathology. The first measure was developed in the 1940's; the second was developed in 1976 and reflects the most recent advances in psychological test construction.

The dimensions of the BPI were derived following exploratory item-level analyses of the MMPI and the Differential Personality Inventory (DPI, Jackson and Messick, 1975). A component analysis was performed on the MMPI items and a forced orthogonalization of the scales was also done. According to Hoffman, Jackson, and Skinner (1975), this transformation eliminated the problem of item overlap, a major shortcoming of the MMPI. Next, the DPI underwent a component analysis. An eleven factor solution was forced, accounting for approximately 78 percent of the total variance. These higher order DPI factors became the operationalized dimensions of the BPI (see Appendix A for descriptions of low and high scores). Finally, the MMPI items and the eleven DPI factors were then intercorrelated. Eleven factors were extracted and underwent a varimax rotation.

The validity of the BPI was investigated in three studies. Jackson (1975) performed a multi-method factor analysis of the BPI using individual self-report, peer-rated responses to the BPI, self-adjective ratings, and peer-adjective ratings. The data demonstrated substantial convergent and discriminant validity of the BPI scales.

Borden, Fekken, and Jackson (1983) evaluated the BPI's effectiveness in predicting placement in diagnostic categories. Correct classification occurred in 33.2 percent of the cases; this value exceeded the amount associated with chance factors alone, 14.3 percent. Govia, Fagan, and Rossi

(1984) used the BPI to determine whether three separate substance-abusing groups could be differentiated. Although only two of the scales, Interpersonal Problems and Alienation, differentiated the groups of substance abusers, correct classification by treatment facility was approximately 70 percent, more than twice the amount attributed to chance, 33 percent. One note of caution about the findings of Govia et al. (1984) was that the sample size was limited (N=72).

The BPI clearly must be classified as a very new instrument. It lacks the extensive validation literature that exists for the MMPI, after which it was modeled in some ways. However, there are cogent reasons for beginning to use the BPI with the military population either as an adjunct to the MMPI or eventually as a replacement.

The primary technical value of the BPI over the MMPI lies in the careful approach to test construction. The difficulties of the MMPI with regard to its psychometric properties are well known. Obsolete items, item overlap among scales, high inter-scale correlations and other technical difficulties cause confusion with clinical interpretation. These problems also make research with the MMPI complex and tedious. The BPI represents an endeavor to avoid these pitfalls. Thus, the second purpose of this clinical investigation was to evaluate the summary statistical data in comparison to the prior research of Jackson and his colleagues.

Method

Subjects

An accidental sample (Kerlinger, 1973) of 172 individuals participated in this clinical investigation. These individuals were active duty personnel and their family members who requested psychological services in three U.S. Army out-patient psychology services. Participants were selected for this investigation by their request for psychological services and completion of a battery of psychological tests (see Table 1).

The sample was comprised of 116 males and 56 females. The mean age was 26.05 with a standard deviation of 6.82, the range was 18 - 56 years. The sample was ethnically divided in the following manner: White - 73.25%, Black - 19.19%, Hispanic - 3.49%, Asian/Pacific Islander - 1.16%, and Other - 2.90%. The mean educational level was 12.49 with a standard deviation of 1.4, the range was 10 - 20 years of education.

Instruments

The MMPI is a 13-scale, 566-item, true-false measure of psychopathology. The 13 constructs of the MMPI are Lie,

Infrequency, Defensiveness, Hypochondriasis, Depression, Hysteria, Psychopathic Deviancy, Masculinity/Femininity, Paranoia, Psychasthenia, Schizophrenia, Mania, and Social Introversion. The Basic Personality Inventory (BPI, Jackson, 1976) is a 12-scale, 240-item, true-false measure of psychopathology. It was constructed to be used in clinical and counseling settings. The 12 constructs measured by the BPI are the following: Hypochondriasis, Depression, Denial, Interpersonal Problems, Alienation, Persecutory Ideas, Anxiety, Thinking Disorder, Impulse Expression, Social Introversion, Self Depreciation, and Deviation (see Appendix B).

Procedure

Participants in this clinical investigation were individuals who were either self-referred to one of three Army psychological services or command referrals for mental status evaluations. They were first administered a standard intake form which solicited demographic information about educational level, military and marital status, the chief complaint and any pertinent history, and their expectations of contact with the respective facilities. Participants were then interviewed by either a psychologist/psychology intern or behavioral science specialist. The MMPI and the BPI were administered after the interview was completed. These tests were administered with instructions that the participant begin with whichever one he/she preferred. They were asked to read the accompanying directions provided on the psychological test booklets. All questions were answered when asked. The psychological test protocols were then scored on an Apple IIe microcomputer by either a psychologist or behavioral science specialist. Feedback on the results of the psychological testing was provided to individual subjects in follow-up sessions.

Results

Summary statistics for the MMPI and BPI clinical scales.

The means and standard deviations for each of the MMPI and BPI clinical scales used in this clinical investigation are listed in Table 1². The data are presented in raw score form.

Table 1

Summary Statistics for the MMPI and BPI Clinical Scales

	Mean	SD	Min	Max
<u>MMPI Clinical Scales</u>				
Lie (L)	4.96	2.41	0.	13.
Infrequency (F)	11.32	8.63	0.	40.
Defensiveness (K)	13.37	5.88	3.	28.
Hypochondriasis (1)	12.12	8.10	0.	32.
Depression (2)	27.52	8.44	4.	48.
Hysteria (3)	26.81	6.66	13.	50.
Psychopathic Deviancy (4)	23.37	6.94	5.	43.
Masculinity/Femininity (5)	29.94	7.40	15.	46.
Paranoia (6)	14.20	5.32	3.	30.
Psychasthenia (7)	20.90	12.49	0.	49.
Schizophrenia (8)	23.93	15.81	0.	64.
Mania (9)	19.83	5.27	7.	33.
Social Introversion (0)	33.04	12.30	7.	61.
<u>BPI Clinical Scales</u>				
Hypochondriasis	6.44 (4.69)	4.88 (3.88)	0.	19.
Depression	7.81 (3.29)	5.84 (3.79)	0.	20.
Denial	8.12 (6.75)	3.54 (3.62)	1.	18.
Interpersonal Problems	8.99 (7.81)	3.86 (3.42)	2.	19.
Alienation	5.20 (3.77)	3.62 (2.78)	0.	15.
Persecutory Ideas	6.90 (3.41)	4.40 (2.34)	0.	19.
Anxiety	7.80 (6.36)	4.72 (3.51)	0.	20.
Thinking Disorder	4.55 (2.64)	3.88 (2.62)	0.	18.
Impulse Expression	8.65 (5.56)	4.67 (3.36)	0.	19.
Social Introversion	7.92 (4.83)	5.84 (3.60)	0.	20.
Self Depreciation	4.37 (1.59)	4.73 (2.26)	0.	20.
Deviation	4.76 (2.98)	3.84 (2.01)	0.	17.

The values enclosed in parentheses are based on normative data provide by Dr. Douglas N. Jackson.

Intercorrelations of the MMPI and BPI clinical scales.

A Pearson correlation procedure was calculated on the MMPI and BPI clinical scales. The MMPI L scale was inversely correlated with all of the BPI scales except for Denial. It was positively correlated with this scale. The MMPI F scale was positively correlated with all of the BPI scales except Denial. It was inversely correlated with this scale. The MMPI K scale was inversely correlated with all of the BPI scales except Denial. It was positively correlated with this scale. Only the Denial scale of the BPI was inversely correlated with the MMPI clinical scales. All of the remaining BPI scales were positively correlated with those of the MMPI (see Table 2).

Table 2

Intercorrelations of the MMPI and BPI clinical scales.*

MMPI Clinical Scales													
	L	F	K	1	2	3	4	5	6	7	8	9	0
HYP	-.24	.46	-.53	.83	.67	.71	.47	.37	.43	.70	.63	.28	.53
DEP	-.22	.63	-.59	.65	.80	.53	.72	.28	.66	.79	.78	.33	.70
DEN	.55	-.26	.39	-.21	-.19	-.08	-.33	-.23	-.23	-.40	-.35	-.28	-.23
IPS	-.37	.49	-.56	.37	.40	.17	.58	.09	.41	.57	.57	.41	.41
ALN	-.28	.68	-.42	.35	.32	.15	.57	-.09	.55	.52	.62	.55	.34
PID	-.26	.65	-.57	.51	.55	.30	.61	.14	.62	.65	.71	.46	.54
ANX	-.32	.51	-.61	.65	.69	.46	.53	.40	.50	.76	.66	.24	.68
THD	-.22	.67	-.46	.59	.52	.44	.52	.10	.57	.62	.72	.51	.41
IMP	-.42	.60	-.60	.53	.47	.31	.57	.12	.53	.68	.71	.47	.49
SOL	-.17	.51	-.47	.41	.54	.24	.50	.11	.47	.57	.58	.18	.66
SDP	-.16	.64	-.43	.51	.65	.37	.59	.18	.59	.63	.66	.21	.64
DEV	-.26	.75	-.55	.67	.61	.45	.67	.12	.66	.73	.81	.52	.55

Note: Decimal points have been omitted.

* All correlations which are greater than .30 are significant at the .01 level.

Principal component analyses of the MMPI and BPI clinical scales.

A principal component analyses of the 25 X 25 matrix of intercorrelations for the MMPI and BPI clinical scale scores was calculated. The decision on the number of components to retain was based on an eigenvalue of .75. While Kaiser's rule, Eigenvalue=1, is often employed to determine the number of components to retain, research by Zwick and Velicer (1982) indicated that this rule may provide an overestimate. The retained components were then subjected to a varimax rotation. Five components were extracted and accounted for 77.054% of the variance. Four of the MMPI scales - K, MMPI2, MMPI5, & MMPI6 - failed to be retained on any of the extracted components. Two of the BPI scales - Anxiety and Deviation - failed to be retained on any of the extracted components. Complex items were excluded from consideration (i.e., items with similar loadings across the various components). Table 3 contains a listing of the retained scales and their respective loadings.

The first component was comprised of the following MMPI scales: F, MMPI-8, & MMPI-9. The Thinking Disorder scale from the BPI also loaded on this component. This component reflected severe forms of psychopathology.

The second component was comprised of two MMPI scales, 1 & 3, and one BPI scale, Hypochondriasis. This component reflected a predominant concern with the somatization of psychological turmoil.

The third component was comprised of two scales. One scale was the L scale from the MMPI. The other one was the Denial scale from the BPI. This component reflected the domain of intrapsychic insight.

The fourth component was comprised of three scales from the MMPI: MMPI-4, MMPI-7, & MMPI-0 and four scales from the BPI: Depression, Persecutory Ideas, Social Introversion, & Self Depreciation. This component reflected an admixture of neurotic personality patterns.

The fifth component was comprised of two BPI scales: Interpersonal Problems and Impulse Expression. This component reflected a predominant concern for maladaptive interpersonal behavior.

Table 3

Scale Loadings of the Varimax Rotated Components of the MMPI and BPI Clinical Scales (with a listing of items loading > .40).

Loading	Clinical Scale
Component I.	
.85	MMPI- 9
.66	MMPI- F
.63	MMPI- 8
.52	BPI - Thinking Disorder
Component II.	
.90	MMPI- 3
.81	BPI - Hypochondriasis
.78	MMPI- 1
Component III.	
.81	MMPI- L
.76	BPI - Denial
Component IV.	
.85	MMPI- 0
.77	BPI - Social Introversion
.69	BPI - Depression
.65	BPI - Self Depreciation
.60	MMPI- 7
.52	MMPI- 4
.51	BPI - Persecutory Ideas
Component V.	
.62	BPI - Interpersonal Problems
.53	BPI - Impulse Expression

Intercorrelation and Principal Component Analysis of the MMPI Clinical Scales

A Pearson correlation coefficient was calculated on the MMPI clinical scales. Modestly high intercorrelations between several of the scales were noted (see Table 4). The 13 X 13 matrix of intercorrelations was then subjected to a principal component analysis. The number of components to retain was estimated by establishing an eigenvalue of .75. A varimax rotation was then performed. Four components were extracted which accounted for 83.25% of the variance (see Table 5).

The first component was comprised of the following MMPI scales: F, MMPI-2, MMPI-4, MMPI-6, MMPI-7, MMPI-8, & MMPI-9. This component reflected a general dimension of psychopathology.

The second component was comprised of following MMPI scales: MMPI-1 & MMPI-3. This component reflected a neurotic constellation of symptomology (i.e., limited insight and pre-occupation with one's bodily functioning).

The third component was comprised of the L and F scales of the MMPI. This component reflected a test-taking attitude.

The fourth and final component was comprised of the MMPI-5 scale. This component reflected aesthetic interest.

Table 4

Intercorrelations of the MMPI Clinical Scales*.

	L	F	K	1	2	3	4	5	6	7	8	9	0
L													
F	-24												
K	51	-48											
1	-23	57	-53										
2	-10	54	-46	72									
3	-01	34	-13	75	67								
4	-27	72	-49	55	66	45							
5	-19	04	-25	33	39	30	12						
6	-22	78	-46	52	59	38	72	15					
7	-41	69	-77	77	79	50	72	33	68				
8	-37	85	-69	74	71	47	80	19	77	90			
9	-35	55	-48	40	17	15	47	-10	45	51	62		
0	-21	54	-66	54	73	32	58	34	53	78	69	13	

Note: Decimal points have been omitted.

* All correlations which are greater than .30 are significant at the .01 level.

Table 5

Scale Loadings of the Varimax Rotated Components of the MMPI
Clinical Scales (with a listing of items loading > .40).

Loading	Clinical Scale
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Component I.	
.84	MMPI- F
.84	MMPI- 8
.82	MMPI- 6
.81	MMPI- 4
.77	MMPI- 0
.76	MMPI- 7
.67	MMPI- 2
Component II.	
.92	MMPI- 3
.73	MMPI- 1
Component III.	
.87	MMPI- L
.63	MMPI- K
Component IV.	
.76	MMPI- 5

Intercorrelation and Principal Component Analysis of the BPI Clinical Scales

A Pearson correlation coefficient was calculated on the BPI clinical scales. Modestly high intercorrelations between several of the BPI scales were noted (see Table 6). The 12 X 12 matrix of intercorrelations were then subjected to a principal component analysis. The number of components to retain was estimated by establishing an eigenvalue of .75. A varimax rotation was then performed. Three components were extracted which accounted for 73.42% of the variance (see Table 7).

The first component was comprised of the following BPI scales: Alienation, Persecutory Ideas, Thinking Disorder, Social Isolation, Self Depreciation, and Deviation. The component reflected a general dimension of psychopathology.

The second component was comprised of only the Denial scale. This component reflected a test-taking attitude.

The third and final component was comprised of the Hypochondriasis and Anxiety scales from the BPI. This component reflected a propensity for somatization.

Table 6

Intercorrelations of the BPI Clinical Scales*.

	HYP	DEP	DEN	IPS	ALN	PID	ANX	THD	IMP	SOL	SDP	DEV
HYP												
DEP	62											
DEN	-27	-24										
IPS	39	53	-41									
ALN	31	49	-33	61								
PID	48	72	-27	53	63							
ANX	65	70	-36	52	37	66						
THD	57	59	-21	43	60	69	54					
IMP	49	64	-48	64	56	61	57	60				
SOL	34	66	-16	46	44	58	47	37	48			
SDP	44	72	-16	47	55	56	54	57	54	55		
DEV	63	73	-25	58	63	69	59	75	73	53	67	

Note: Decimal points have been omitted.

* All correlations which are greater than .50 are significant at the .01 level.

Table 7

Scale Loadings of the Varimax Rotated Components of the BPI
Clinical Scales (with a listing of items loading > .40).

Loading	Clinical Scale
<hr/>	
Component I.	
.80	Alienation
.73	Self Depreciation
.71	Persecutory Ideas
.70	Social Introversion
.70	Deviation
Component II.	
.91	Denial
Component III.	
-.87	Hypochondriasis
-.76	Anxiety

Discussion

The results of the present clinical investigation provided favorable findings of the relationship between the MMPI and BPI. In reviewing these findings attention will be given to the following: First, attention is given to the intercorrelation of the MMPI validity scales and the BPI clinical scales. Second, attention is given to the intercorrelation of the MMPI and BPI clinical scales. Third, the findings of a principal component analysis with a varimax rotation of the retained components for the MMPI and BPI clinical scale scores are evaluated. Fourth, the intercorrelations of the individual MMPI and BPI scales are evaluated. Fifth and final, the summary statistics for the present sample are compared with normative data provided by Jackson (1985).

Intercorrelations between the MMPI validity scales and BPI clinical scales supported the construct validity of the latter instrument. The L scale was inversely correlated with each of the BPI clinical scales except Denial, which was positively related to L. The relationship between the F scale and the BPI clinical scales was equally impressive. Only the Denial scale was inversely correlated with F. All remaining correlations were positive and moderately high. The K scale, like L, was inversely correlated with each scale except Denial.

The pattern of findings evident in the relationship between the MMPI validity scales and the BPI clinical scales, at this preliminary level of observation, clearly suggested the BPI is measuring features of psychopathology. While not all correlations were uniformly high, all but two of them exceeded a probability level of .20. The interesting finding of the higher correlation of Denial and L than with Denial and K suggested the Denial scale may be more accurately assessing one's willingness to be truthful rather than defensive, as was previously postulated (Lei and Skinner, 1980; Skinner and Aller, 1983).

The relationship among F and K from the MMPI with the BPI clinical scales was substantial. Increased reporting of pre-occupation with bodily functioning, feelings of dysphoria, problems in getting along with others, feelings of alienation, mistrust, anxiety, strange or unusual thoughts, impulsiveness, withdrawal, and self-denigration were all associated with increased scores on F. The relationship between the Deviation scale, a non-uni-dimensional construct which reflects a tendency to admit to more pathology symptoms, and F was especially noteworthy. The data suggested that the Deviation scale may be appropriately interpreted analogously to F.

On the basis of the relationship between L and F and the Denial and Deviation scales, the data suggested these scales

may be instrumental in ascertaining the validity of the test. Additional research on the external validity of these scales is essential. In the interim, when reviewing BPI protocols, examination of the Denial and Deviation scales may provide information about an individual's approach to the test. Individuals who score high on Denial and low on Deviation may be conjectured to be presenting an "I'm okay" facade. Such a speculation is consistent with research by Kilduff and Velicer (1983), who investigated the potential for dissimulation on the BPI. In a similar manner, individuals who appear maladjusted are likely to obtain several elevated clinical scales but obtain a much lower score on Denial.

A multi-trait/mono-method matrix (Campbell and Fiske, 1959) was produced when the MMPI and BPI clinical scales were intercorrelated. The results provided further evidence for the construct validity of the BPI. Before reviewing these findings, it should be kept in mind the BPI does not possess a scale comparable to MMPI scale 5. It should also be noted the Denial scale did not correspond to MMPI scale 3.

Convergent validity was noted for the following BPI constructs: Hypochondriasis, Depression, Interpersonal Problems, Persecutory Ideas, Anxiety, Thinking Disorder, Impulse Expression, and Social Introversion. The MMPI does not possess scales comparable to Self Depreciation and Deviation. Nevertheless, the relationship between Self Depreciation and MMPI scale 2 was considerable. The Deviation scale was noted above as being more similar to the F scale.

A number of issues can be raised about the capacity of the MMPI to actually measure unified constructs of psychopathology. Jackson (1974) suggested the high intercorrelation of the clinical scales and item overlap, which produces spuriously high intercorrelations, render the MMPI a questionable instrument for specific types of psychopathology. In addition, the content saturation of the clinical scales was comprised by item overlap.

Despite such discrepancies associated with the MMPI, the wealth of data amassed revealed an underlying relationship between the intended construct and the array of items. However, one observes a more general measure of psychopathology in the MMPI and not discrete individual dimensions of psychopathology. Nevertheless the instrument can be appropriately employed in an evaluation of the construct validity of the BPI. As stated above, the BPI was designed to overcome many of the psychometric flaws of the MMPI. The patterns of findings between the two measures are optimistic and indicate the usefulness of the BPI in clinical settings.

The intercorrelation matrix of the MMPI and BPI clinical scales was scrutinized. The resulting component extractions

provided additional information about the two measures. A primary component of severe psychopathology was evident, which was mostly comprised of MMPI scales and the Thinking Disorder one from the BPI. The capacity to extract other BPI constructs on the initial component may have been hampered by the artificially high intercorrelations produced by the item overlap on MMPI scales.

Both measures appeared to assess an underlying dimension of somatization. The second component was comprised of scales 1 and 3 from the MMPI and the Hypochondriasis scale from the BPI. Similarly, both measures appeared to measure an underlying dimension of truthfulness, or freedom from dissimulation.

A strong underlying dimension of neurotic functioning was observed across both instruments. The principal component analysis extracted four of the BPI scales - Social Introversion, Depression, Self Depreciation, and Persecutory Ideas. These scales, at less extreme values, suggested more neurotic personality styles than was observed on the initial component extracted.

The final component retained suggested the BPI was assessing an underlying dimension of maladaptive interpersonal behavior. The BPI scales of Interpersonal Problems and Impulse Expression were marker variables. Such a finding is consonant with research by Govia et al, (1981), which revealed the BPI's capacity to distinguish between diverse substance abusing groups.

When the individual intercorrelations between the two measures were examined, it was expected both the MMPI and BPI would produce substantially high intercorrelations. The MMPI intercorrelations were expected to be even higher than those on the BPI. This was postulated based on the considerable item overlap across several of the clinical scales. In reviewing the findings, this expectation was upheld. The intercorrelation matrices for both measures revealed moderately high values. And, as anticipated, many of the correlations were higher on the MMPI.

In some respects, the high intercorrelation among both sets of intercorrelations should not be surprising. Psychopathology is multi-determined. While such a perspective may seem contradictory to the intended purpose of this clinical investigation (i.e., to obtain empirical evidence of the merits of using the BPI in place of the MMPI), it does highlight the need to view psychopathology in a hierarchical manner.

One method of evaluating the relationship among dimensions of behavior is factor analytic research. Recent developments in such procedures, while not available to the current authors, permit clinical investigators to examine the

hierarchical relationships among specified constructs. Preliminary estimations of such relationships may be obtained from the findings of principal component analyses.

When the underlying component structure of the MMPI and BPI were examined separately, the results produced few actual dimensions of psychopathology. One could have easily argued the extraction of more dimensions of psychopathology; however, such an endeavor would have "milked the data" for perhaps more than was inherent.

The MMPI was comprised of four predominant dimensions: a general dimension of psychopathology, pre-occupation with bodily functioning, test-taking attitude, and aesthetic interests. The BPI was comprised of three predominant dimensions: general psychopathology, denial, and somatization. While the MMPI appeared to tap more severe psychopathological functioning on the primary component, the BPI was more concerned with neurotic functioning. The remaining components were comparable to those retained on the MMPI with the exception of the aesthetic interests dimension.

Given the many problems associated with the MMPI item pool and any endeavors to determine the component structure of each instrument, it may be more appropriate to examine such structure based on individual items rather than scale scores. In the present investigation, only the scale scores were examined. This was necessary due to the limitations of the SYSTAT program to handle an intercorrelation matrix of 240 X 240 variables. Performing such a procedure at the item level will further assess the internal validity of the BPI (Campbell and Stanley, 1966).

When the summary statistics of the present clinical investigation were compared to the normative data provided by Jackson (1985), there were noted elevations across all of the clinical scales in the present sample. Mean differences were not examined statistically; however, the trend of higher scores across clinical populations was suggested. This pattern was similar to the findings of Gevin et al., (1987) and Reddon (1980). Such findings, while awaiting additional analysis, clearly suggested the BPI was capable of differentiating clinical versus non-clinical samples.

In reviewing the findings of the present clinical investigation, several implications should be noted. First, the BPI appears to be a valuable tool in assessing psychopathology. The constructs identified in this instrument were significantly correlated with similar ones on the MMPI. Second, the combination of the Denial and Deviation scales may provide important information about the manner in which individuals approach taking the test. Third, the component structure of the BPI revealed its ability to tap significant domains of psychopathological functioning.

When the authors administered the BPI to individual patients, an overwhelming number of patients have extolled the ease in responding to the instrument. Items are not ambiguous, redundant, or archaic. The brevity of the instrument rarely produces fatigue. Such considerations in the use of psychological testing strongly suggest this instrument should be seriously considered. For example, neuropsychological patients are less likely to encounter difficulty responding to the BPI, in marked contrast to the MMPI.

Finally, the results of the present clinical investigation suggest additional research on the BPI must be undertaken. Attention should be given to the external validity this instrument with clinical observations, self-report on symptom checklists, and additional measures of psychopathology. Attention should also be given to further research on the internal consistency of the instrument. Item level analyses are needed to insure the construct validity of the included dimensions.

Reference notes

1. The following individuals collaborated in this clinical investigation by providing MMPI and SPI protocols:

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2. The data was analyzed on an IBM-PC with the SYSTAT statistical software package, Version 2.0. Special thanks to Dr. Wayne F. Velicer, Professor, Department of Psychology, University of Rhode Island, who made this program available to first author.

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Appendix A*

Basic Personality Scale Descriptions

<u>Scale</u>	<u>Low Scorer</u>	<u>High Scorer</u>
Hypochondriasis	Is without excessive bodily concern or preoccupation with physical complaints. Absenteeism due to ill health likely to be below average.	Frequently thinks he/she is sick, Complains regularly of peculiar pains or bodily dysfunctions. Discusses such topics, frequently revealing a pre-occupation with his/her complaints.
Depression	Reports a usual feeling of confidence, cheerfulness, and persistence, even when experiencing disappointment. Has an optimistic attitude about his/her future.	Inclines to be down-hearted and show extreme despondency; considers himself to be inadequate; may be listless, remote and preoccupied; looks at his/her future pessimistically.
Denial	Accepts his/her feelings as part of him/herself; not afraid to discuss unpleasant topics. Can answer questions about him/herself frankly; avoids impression management. Shows normal affect.	Lacks insight into his/her feelings and causes of his/her behavior. Avoids unpleasant, exciting or violent topics. Relatively unresponsive emotionally.
Interpersonal Problems	Experiences less than average irritation from noises, changes in routine, disappointment and mistakes of others; respects authority and prefers clearly defined rules and regulations; cooperates fully with leadership and readily accepts criticism from others.	Is often extremely annoyed by little inconveniences, frustrations or disappointments; will frequently be uncooperative, disobedient, and resistant when faced with rules and regulations; reacts against discipline and criticism.

ScaleLow ScorerHigh Scorer

Alienation

Ordinarily displays ethical and socially responsible attitudes and behavior; reports a sense of obligation toward society and its laws.

Expresses attitudes markedly different from common social codes; is prone to depart from the truth and behave in an unethical and untrustworthy manner; feels little or no guilt.

Persecutory Ideas

Trusts others and doesn't feel threatened. Accepts responsibility for the events in his/her and doesn't attribute maliciousness to others.

Believes that certain people are against him and are trying to make his/her life difficult and unpleasant. Inclined to brood.

Anxiety

Remains calm and unruffled even when confronted by unexpected occurrences. Takes things as they come without fear or apprehension. Maintains self-control even in a crisis situation.

Easily scared. Little things, even an idea, can throw him into a frenzy of anxiety. Afraid of novelty and of the possibility of physical or interpersonal danger.

Thinking Disorder

Has no difficulty distinguishing his/her daydreams from reality. Is able to concentrate normally and to maintain sensible conversations.

Is markedly confused, distractable and disorganized. Cannot remember even simple things from day to day. Reports that he/she feels like he/she is living in a dream-like world, that people appear different to him/her and that he/she feels different from them.

<u>Scale</u>	<u>Low Scorer</u>	<u>High Scorer</u>
Impulse Expression	Appears to be even-tempered and level-headed; carefully considers the future before acting; generally has the patience to cope with a lengthy and tedious task.	Lacks ability to think beyond the present to consider the consequences of his/her action; is prone to undertake risky and reckless actions; inclined to behave irresponsibly; finds routine tasks boring.
Social Introversion	Enjoys company. Likes to talk and knows many people. Spends much of his/her time with others.	Avoids people generally. Has few friends and doesn't say much to those he/she has. Seems to be uncomfortable when around others. Prefers asocial activities.
Self Depreciation	Manifest a high degree of self-assurance in dealings with others. Not afraid to meet strangers; speaks with confidence about a variety of topics; believes in his/her ability to accomplish things.	Degrades himself as being worthless, unpleasant, and undeserving. Generally expresses a low opinion of him/herself and refuses credit for any accomplishment.
Deviation	Generally shows behavior patterns similar to those of a majority of people. Tends to be free from unusual symptoms and modes of thought.	Displays behavior patterns very different from most people's. Admits to unusual and pathological characteristics.

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Appendix B

SAMPLE ITEMS ON THE BASIC PERSONALITY INVENTORY.

HYPOCHONDRIASIS:

- 13. Sometimes my legs feel so weak that I can't walk. (T)
- 1. It's easy for me to keep physically healthy. (F)

DEPRESSION:

- 2. My present situation seems quite hopeless. (T)
- 14. I rarely feel disappointed. (F)

DENIAL:

- 15. Very few things excite me. (T)
- 3. I care about what other people think of me. (F)

INTERPERSONAL PROBLEMS:

- 4. No one gets away with insulting me. (T)
- 16. I think rebellion is hardly ever necessary and right. (F)

ALIENATION:

- 5. I would enjoy betting on horses. (T)
- 17. I believe most people in the world are honest. (F)

PERSECUTORY IDEAS:

- 18. Someone has robbed me of my free will. (T)
- 6. No one is making things go wrong for me. (F)

ANXIETY:

- 7. I become afraid when I must go anywhere alone. (T)
- 19. Even at the end of a hard day, I remain relaxed and at ease. (F)

THINKING DISORDER:

- 20. A special voice follows me everywhere I go. (T)
- 8. Faces of people I used to know never appear before me. (F)

IMPULSE EXPRESSION:

- 9. Many times I do things without thinking. (T)
- 21. I cannot imagine doing something reckless just for the fun of it. (F)

SOCIAL INTROVERSION:

- 22. I do not talk to people enough to let them really get to know me. (T)
- 10. If there are people around me, I like to be with them. (F)

SELF DEPRECIATION:

- 11. I long ago gave up any hope of ever amounting to anything. (T)
- 23. I am worthy of "the good things in life." (F)

DEVIATION:

- 12. I have periods when my mind races ahead so fast that I cannot think clearly. (T)
- 132. There have been of time when I have used alcohol to excess. (F)

BIOFEEDBACK SYSTEMS TEACHING: THE COMBINATION OF
SELF-REGULATION STRATEGIES AND FAMILY THERAPY
IN THE SELF-HEALING OF ASTHMA

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HOPE FOR ASTHMATICS

BIOFEEDBACK SYSTEMS TEACHING: THE COMBINATION OF SELF-REGULATION STRATEGIES AND FAMILY THERAPY IN THE SELF-HEALING OF ASTHMA

By Erik Peper

Wheee. Wheee. Wheeze. The heaving shoulders and gasping for air tell me that Jim, my nine-year-old son, is having his weekly asthma attack. As his mother, I feel helpless seeing him gasp for air. Often I feel anxious...Is it going to get worse? All I can do is lie next to him in bed and be supportive. Yet even then, I cannot affect the wheeze...What can I do?...Is there something Jim can do to help himself...What can we as parents do when we feel so helpless and anxious?...All I can do is give him some love...Is there any other choice? Will he always be bothered by his breathing? Will he always wheeze when he wants to play soccer and run? Will I always have a house without carpets or have to be careful with his diet? Will his life often turn into wheezing?

I speak as a concerned mother. What can the parent do? What about the child? What should one teach the child? Should one include the child in what is the scientific data and evidence?

As a clinician, when they participate in the Biofeedback Systems training, to modify and change their asthma so that the frequency and intensity of the attack is reduced.

In the development of the Biofeedback Systems teaching, I have synthesized two recent clinical approaches--somatic self-regulation and family therapy concepts. This synthesis adds to the effectiveness of either approach. Specifically, somatic self-regulation strategies such as biofeedback and many other behavioral self-regulation have shown clinical success in the treatment of many chronic conditions such as hypertension and migraine (Olton and Neerberg, 1989; Olton, 1991; and others, 1979). However, these strategies are at times limited when the illness is part of the family system. The family system which surrounds the patient may not change, thereby reinforcing the chronic illness-producing behaviors.

Biofeedback training mobilizes the individual to take responsibility for his or her health and simultaneously teaches appropriate autonomic skills which are opposite to those processes which facilitate or maintain the illness. In the process of learning autonomic control, the individual experiences enhanced autonomy and individualization which is opposite the enmeshment which is so common in families with chronic illness. This sense of enhanced autonomy is illustrated by a nine-year-old girl who after her biofeedback training had migraines twice as often as before. After two weeks of home training, the child reported that she was no longer afraid of thinking.

"I wanted to make sure that I was in control of everything.
My arms got warm.
My legs. I heard them warming.
Just to sit, to stand, to move, to swim.
I really loved all the motion.
I was so proud of myself because I had succeeded."
The room temperature has increased from 22 degrees to 26 degrees F.

As a result of this training, the child had experienced complete relief from her backaches (eight year follow-up). In addition, she appeared to have internalized the learning process to include a variety of conditions or to develop her own learning a conceptually, to be responsible for her own health and psycho-social growth (Peper and Blaser, 1984).

Family therapy, on the other hand, is a powerful approach to changing the family relationship and corresponding family-related dysfunctioning such as emotional problems (Minuchin, Rosman and Baker, 1978). However, it may not teach the individual new autonomic or cognitive skills by which he can maintain his health. The systems training component teaches families skills which enhance relatedness and mutually respectful involvement. By successfully encouraging family participation and change, the newly learned health promoting skills can now be maintained within the family unit.

It is my belief that Biofeedback Systems Teaching will be the predominant treatment of choice for children who have many somatic-oriented complaints. Besides my work with asthma, this approach would also be effective in cases of childhood illnesses such as migraine, epilepsy, bellyache and hyperactivity. In this paper, I will report the detailed outline of this approach with background concepts, components of the initial family session, and components of subsequent sessions for the learning and self healing of children with asthma (Peper and Blaser, 1984).

TREATMENT AND SELF-HEALING OF ASTHMA

The treatment of asthma has traditionally emphasized medications and avoidance or desensitization of allergens. More recently, biofeedback assisted techniques, relaxation training (Kotses et. al., 1978) or way breathing (Johnson and Rich, 1976), and combined with diaphragmatic breathing training (Peper, Klomp and Levy, 1984; Ford and Peper, 1984) have been successfully used. However, these approaches do not generally address the systems in interaction which are an undercurrent in dry climates. Asthma, in particular, has strong psychosomatic components. The psychosocial interactions associated with asthma have been well-documented, and symptoms are reduced by 50 percent in asthmatic children after the end of a "parental therapy" - the removal of the child from the family system (Blaser, 1981; Peshkin, 1979).

In the last several years, we have developed a treatment model and philosophy which combines an integrated approach of biofeedback, family therapy, and Peper's (1981) work with asthma. This approach (Peper and Blaser, 1984) has integrated parents and professionals, working with the child and family system, and with the

example, after a one and a half hour initial home training session, a young asthmatic and his parents continued to practice the skills by themselves. At the three month follow-up they reported:

"We have had tremendous results with Bob. Initially some of the breathing exercises brought on some wheezing which Bob found unpleasant. After only four or five sessions (the parents did these sessions at home with their nine-year-old son), Bob seemed to fall asleep faster than previously. Bob's progress was very rapid, and after 20 sessions, we noted a tremendous improvement in his health. Wheezing was minimal, he had few respiratory problems, and he has had no attacks since the end of November. His attendance at school is spectacular compared to previous years."

Parental reports of this type are common from families who participate in this program. The major components of the treatment program are individually adapted to each family. An initial session helps to orient the family to a self-healing systems strategy for asthma treatment. Subsequent sessions encourage the assimilation of skills taught in the initial session and emphasize the use of biofeedback assisted diaphragmatic-breathing.

BACKGROUND CONCEPTS

Although the exact mechanisms of asthma are not understood, a common observation is that during the "asthmatic attack" the person tends to breath paradoxically, also known as thoracic breathing. This paradoxical breathing and/or breath holding becomes the habitual response to any stimuli. In the extreme form, paradoxical breathing means that during inhalation, the abdomen goes out and the chest drops down. This paradoxical breathing is highly inefficient. The system is working against itself, as the muscular efforts of the upper chest are working in opposition to the movement of the abdominal wall.

Paradoxical breathing, an ergotropic response, inhibits the body's self-healing mechanisms. This process activates sympathetic arousal, the chronic triggering of the alarm reaction, which may enhance excessive allergic reactivity as well as cardiovascular pathology (Grossman, 1981). On the other hand, gentle effortless diaphragmatic breathing, a trophotropic response, encourages the prohomeostatic mechanisms which mobilize health. This breathing pattern of about 10-12 Hz facilitates relaxation. For example, slow diaphragmatic breathing under stress is one of the major components of Green and Green's (1979) successful treatment strategy for hypertension. In addition, slower diaphragmatic breathing often increases peripheral temperature which is associated with a decrease of sympathetic arousal (Fried, 1984).

Paradoxical breathing tends to be triggered during the exposure of stressors such as, allergens, exercise, or anxiety. This thoracic breath pattern is also common in many illnesses. For example, Humes and Nuernberger (1980) reported that the primary or habitual breathing

pattern of all 153 patients in a coronary care unit of a large hospital was thoracic.

Paradoxical breathing often follows the breath holding which occurs when people try something, startle, initiate movement, or shift their attention. This concept is illustrated in the following exercises. Do these either by yourself or by guiding another person through them:

Exercise 1: Stand up rapidly and then sit down again.

Exercise 2: Snap your fingers about once a second. With each snap, shift your eyes so that with one snap you look to the extreme right, and the next snap, you look to the extreme left. Repeat for about 10 or 15 times.

What happened to your breath pattern? If you did not observe any changes repeat these same exercises. Remember, self-observation often affects the breath pattern since respiration is both automatic and voluntarily controlled. Instead, observe someone else's breath pattern when they do these two exercises, especially when they "try to do it perfectly." In almost all cases the people tend to hold their breath or gasp. This is often followed by a paradoxical breath.

Although effortless diaphragmatic breathing appears easy to teach, it often is not. Usually, the person tends to breathe thoracically when he "tries to breathe correctly." To facilitate learning diaphragmatic breathing, we have developed a biofeedback strategy that monitors the electromyographic activity (EMG) from the upper chest pectoralis, trapezius, scalene muscles or a combination of all.

With this EMG feedback, subjects can learn diaphragmatic breathing while keeping the chest more relaxed. For example, Peper, Klomp Levy (1983) trained subjects to reduce their trapezius electromyographic activity while breathing. The EMG biofeedback signal was the error signal indicating thoracic breathing. The task was to keep the chest more relaxed while breathing. The only way to reduce the EMG activity is to breathe diaphragmatically.

Asthmatic subjects can also reduce their thoracic tension while they breathe. Konuk and Peper (1984) reported that four asthmatic subjects (an asthmatic history from 5-21 years ($X = 11.8$)) improved significantly when they participated in a multimodal program for 7 sessions which focussed upon relaxation, electromyographic-trained diaphragmatic breathing as well as incentive spirometer feedback and desensitization, imagery and reframing strategies. When they practiced simultaneous trapezius EMG and inspiratory volume feedback, their trapezius EMG activity was reduced while their maximum inhalation volume was increased.

The most challenging component of this work is generalizing the learned skill outside the clinical setting, since under stress people tend to revert back to their previous thoracic breathing pattern. For example, emotionally excited people often gasp for air (paradoxical breath) between their sentences. The key of successful training is the

transfer of learning -- to generalize the diaphragmatic breathing pattern under all conditions -- from exercising, laughter, to arguing with a parent or spouse.

COMPONENTS OF THE INITIAL FAMILY SESSION

In working with asthmatic children, the family is automatically included. In this way, the child and the parents learn new patterns of health. The first stage for successful teaching of necessary skills. During this first session the therapist needs to:

A. Join with the family in story telling, humor, and the modeling of a relaxed attitude (develop an easy rapport).

B. Strive to develop a "Yes set", in which the therapist endeavors to show the family that he truly understands their situation. He tells to the family members about what it feels like to be part of an asthmatic system. He might say to the parents: "Whenever your child gets wheezy, you must really feel hopeless and frustrated". To the asthmatic child he might say: "You are really sensitive to emotions and environmental stimuli". The purpose of this approach is to have the family members continuously agree with what the therapist is saying. Thus, when homework assignments are given they continue to say, "Yes;" they are also likely to say "Yes" to the goals of treatment.

C. Do something different from what the family has previously experienced, thereby emphasizing on a metacommunication level that something positive can indeed occur. For example, NO detailed history is taken at the beginning of treatment, as this might reinforce the family's experience of previous unsuccessful treatments.

D. Teach diaphragmatic breathing to the asthmatic. The child is trained to allow his breath to flow easily, while keeping his chest relaxed. It is critical that the therapist model diaphragmatic breathing himself, since breath patterns tend to be learned by imitation.

E. Discuss the concept that emotions are contagious. Thus, an individual's emotions, both positive and negative, tend to encourage the same emotion in others. For example, when an asthmatic child begins to wheeze, his parents often become anxious. Their anxiety triggers more fear in the child, which leads in turn to increased levels of thoracic breathing and gasping. The asthma attack becomes more severe, inducing still more concern and worry in the parent. The runaway feedback system, which is thus triggered, may eventually lead to hospitalization.

F. Teach the entire family the skill of diaphragmatic breathing. Often the parents of asthmatic children when under stress tend to breathe thoracically. In order to become helpful role models, they need to alter their habitual respiratory patterns and instead use diaphragmatic breathing. It is critical that the parents learn and confidently practice diaphragmatic breathing during the day and especially teach diaphragmatic breathing to the child.

G. Teach the parent how to train her youngest child in diaphragmatic breathing. The parent are a fit and the child diaphragmatically while training is carried. The parent need to work with the child every day.

The process of teaching the parents to breath diaphragmatically is aimed at changing parents' stress level which would affect the family interactions, while guiding the parents to practice with the child at home is aimed at changing the previous asthma attentional relationships. Instead of receiving attention when wheezing, the child now experiences attention when he is practicing health-mobilizing breathing.

H. Teach the child to wheeze purposefully (symptom prescription). The therapist first has the child breath diaphragmatically, and then asks him to begin to gasp, breath into his chest and induce wheezing. Next, the child switches back to diaphragmatic breathing. This is practiced until the child can create wheeziness on cue and then return to diaphragmatic breathing. One reason for the use of symptom prescription is to break the asthmatic cycle. Formerly, wheezing increased anxiety, which led to asthma. Now, however, the child is trained to trigger diaphragmatic breathing when the wheezing starts, thereby interrupting the runaway feedback system. Secondly, purposeful wheezing is a strategy which helps to shift unconscious to conscious behavior.

I. Shift the family dynamics. The parents are asked to practice diaphragmatic breathing and purposeful wheezing every day with the child. The goal here is not only skill development, but the restructuring of the asthmatic child's relationship with his parents. Previously, the child received attention from his parents when he was wheezy. Now he experiences parental attention through their joint practice of diaphragmatic breathing and symptom prescription. This reinforces changes in the child's behavior.

J. Identify the child's favorite food. If this food is one to which many asthmatics are allergic, design family strategies to eliminate the food temporarily. These "allergic" foods often include dairy products (ice cream), chocolate, peanut butter, etc.

K. With some families, end the session with paradoxical statements. The therapist expresses strong doubt that the family will do the exercises. Thus, paradox is used to trigger participation by the family. The family may see the therapist's statement as a "challenge", or if they avoid doing the homework (resistance to treatment), they are affirming what the therapist predicted. Thus they are put in a double bind situation.

COMPONENTS OF SUBSEQUENT SESSIONS

A. Review home practice of diaphragmatic breathing, symptom prescription and dietary changes. Develop and adapt new strategies as needed.

B. Continue to teach diaphragmatic breathing using pH feedback over the trapezius and pectoralis. Often the parents can learn to feel with their hands the muscle tension in their child's upper chest. The homework practices are both inhaling and exhaling while the parents supply feedback and remind the child to keep his chest relaxed. Once exhalation practices without touching the chest can be given such as blowing bubbles or blowing out candles.

C. Introduce and train with the Volume, an experimental electronic device which measures the volume of inhalation. The device can be used to increase tidal volume while breathing diaphragmatically, with the child

an incentive spirometer for home practice. The person could even place the spirometer on his lap and observe the movement of the spirometer as another feedback indicator of diaphragmatic breathing.

D. Discuss and train for transfer of learning. The child is taught to breathe diaphragmatically in more and more complex situations. For example, he is asked to continue to breathe diaphragmatically while running. This role rehearsal is practiced both at home and in the office.

E. Teach hand warming and reduction of skin conductance with biofeedback. In our experience, asthmatic children tend to react to many stimuli with an increase in skin conductance (increased perspiration of the hands). For example, when they start wheezing either as an exercise of symptom prescription or the beginning of an asthmatic attack, skin conductance tends to increase. By learning to inhibit this response, the wheeziness may be aborted. The child is taught simultaneously to warm his hands and reduce his skin conductance. Children learn hand warming very rapidly and also learn to inhibit the skin conductance increase. Often they practice hand warming with a small hand-held thermometer and/or practice reducing the skin conductance with an economical galvanic skin response feedback device.

F. Structured desensitization with allergens (food and/or inhalants). Learning to inhibit electrodermal activity is often helpful in this procedure. This is the physiological analogue of systematic desensitization.

SUMMARY

The biofeedback systems intervention avoids blaming either the parents or the child for inducing asthma. Instead it restructures the family interactions with the child and simultaneously teaches him non-asthma breathing patterns. As one parent wrote after hearing the outlines of this strategy:

...I sat him (age 8) on my lap and practiced abdominal breathing with him until he could do it easily and well, about five minutes or less. Then I told him to close his eyes, take a deep breath and to consciously relax his entire body and mind as he breathed out, becoming totally limp. Because he was in my lap with his body fully supported by mine, I could feel when he totally relaxed and gave him feedback about it. Then, I had him make himself wheeze and follow that by the deep breath and relaxation. That was all. Two nights later when I wanted to practice again he said that he didn't need to. He had used it during the soccer game and had controlled his asthma...

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MILITARY PSYCHOLOGY
PAPERS

WORKLOAD SAMPLE OF AMEDD SETTINGS
PROVIDING OUTPATIENT MENTAL HEALTH SERVICES:
AN EPIDEMIOLOGIC AND MANAGEMENT TOOL

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The United States Army Health Care Studies and Clinical Investigation Activity has been conducting a study to capture outpatient workload. The Ambulatory Care Data Base study collects diagnostic and resource use data in six Army outpatient settings. Specific optical mark reader forms were developed to capture outpatient behavioral science encounters in Psychology, Psychiatry, and Social Work clinics. The forms include lists of common procedures and diagnoses that the clinical consultants felt were most frequently accomplished. The workload captured from all clinics (to include Psychology, Community Mental Health, Psychiatry, and Child Guidance clinics) across the six facilities has averaged about 160,000 patient visits per month from December 1985 to the present. The test is being conducted to develop data capture instruments which reflect the workload accomplished in outpatient settings.

The Psychology and the Psychiatry forms are based on DSM-III and ICD-9-CM codes. The forms allow entering one diagnosis or reason for visit from Axis 1 and up to five secondary diagnoses or reasons for visit from Axis 2, or make rule out diagnoses for initial visits. From the menu of general evaluations, services, and procedures, the health care practitioner can mark as many codes as appropriate. Unlisted diagnoses can be entered. Whether an illness or injury is job related can be described. The Psychology form allows for psychometric assessments. Two providers can be recorded for a visit; the time spent, and the reasons for the encounter can be determined as well.

There are many potential uses for the ambulatory care data; these include: epidemiological research and program management. Patient data can indicate the characteristics of the patients that present for treatment. The patient characteristics include: gender, ethnic/racial background, age, and category of beneficiary. Clinic referral sources can be determined; or whether patients have appointments or are walk-ins. The time spent with a patient, by whom, for what reason(s), and to accomplish what procedures or treatments can be assessed. The most commonly used diagnoses and procedures can be documented and used to plan for staffing and personnel management. Supervision and consultation requirements can be examined. Program managers will be able to project the effects of new program initiatives on staff time and resources.

Data from the psychology service, the community mental health service, and the psychiatry service of the six test sites will be examined for apparent epidemiological trends and program management considerations. The six test sites are: Brooke Army Medical Center, Fort Bragg, Fort Campbell, Fort Jackson, Fort Polk, and Redstone Arsenal. Since this is an ongoing test, only trends will be reported. The optical mark reader forms will be revised when the system is expanded.

EPIDEMIOLOGICAL TRENDS

Overview.

Epidemiological trends will include both the individual clinics and the aggregate of all clinics at the medical treatment facilities for: patients encountered, gender, ethnic/race, age, category of patients, and referral sources. The numbers reported are from those who registered and filled out encounter forms from January through December 1986. The time and reasons providers meet with patients will be discussed. The most frequently used procedures, treatments, assessments, and diagnoses will be described as well.

Patients Encountered.

The number of patients registered at all of the clinics at the six sites from January through December 1986 was 680,535. These patients were seen at ambulatory care clinics during 1,996,942 encounters. For psychology, 9,065 patients made 10,090 encounters at psychology services. At mental health/community mental health service, 10,707 patients made 11,097 encounters. At psychiatry, 10,207 patients had 11,343 encounters at psychiatry clinics.

Gender.

The distribution of patients who registered and presented at psychology was: 54% males and 46% females. The distribution of patients who registered and presented at mental health/community mental health service was: 59% males and 41% females. The distribution at psychiatry was 52% females and 48% males.

Ethnic/Race.

The ethnic/racial background of patients who registered and presented at psychology was: 20% Black, 79% White, and 1% other. For mental health/ community mental health service, the ethnic background of the patients was: 19% Black, 80% White, and 1% other. For psychiatry, the ethnic background was: 20% Black, 78% White, and 2% other.

Age.

The most frequent age range for the patients presenting at psychology was from 19 to 24, with a modal age of 20 years. The most frequent age range for patients at mental health/community mental health service was from 18 to 27, with a modal age of 19 years. The most frequent age range for patients at psychiatry was from 19 to 25, with a modal age of 20 years.

Category of Patients.

The categories of Army patients most frequently seen in psychology were: Army active duty (52%), Army active duty dependents (28%), Army dependents of retired/deceased (12%), and Army retired (8%). The categories of Army patients most frequently seen in mental health/community mental health service were: Army active duty (68%), Army active duty dependents (19%), and Army dependents of retired/deceased (7%). The categories of Army patients seen in psychiatry were: Army active duty (48%), Army active duty dependents (25%), Army dependents of retired/deceased (17%), and Army retired (10%).

Referral Source.

For referrals to psychology, the major sources were: 30% self referrals, 11% unit, 19% inpatient clinic, 29% ambulatory clinic. For referral to mental health/community mental health service, the major sources were: 29% self referrals, 17% unit, 33% inpatient clinic, 15% ambulatory clinic. For referral to psychiatry, the major sources were: 6% self referral, 2% unit, 43% inpatient clinic, and 29% ambulatory clinic.

Visit Reason.

The reasons for visit to psychology were: 17% health maintenance, 26% acute problem, 54% chronic problem, and 2% trauma/injury followup. The reasons for visit to mental health/community mental health service were: 30% health maintenance, 41% acute problem, and 26% chronic problem. The reasons for the visit to psychiatry were: 23% health maintenance, 26% acute problem, and 47% chronic problem.

Appointment Status.

The appointment status of patients at the psychology service was: 74% scheduled, 25% unscheduled, and 1% emergency. The appointment status of patients at mental health/community mental health service was: 83% scheduled, 12% unscheduled, and 4% emergency. The appointment status of patients at psychiatry was: 72% scheduled, 22% unscheduled, and 5% emergency.

Disposition.

The disposition of patients from psychology was: 27% discharged from clinic, 9% return as needed, 62% return appointment, 2% admitted. The disposition of patients from the mental health/community mental health service was: 20% discharged from clinic, 11% return as needed, 62% return appointment, 3% admitted. The disposition of patients from psychiatry was: 19% discharged from clinic, 16% return as needed, 58% return appointment, and 4% admitted.

Supplemental Disposition.

The supplemental disposition of patients from the psychology service included: 11% referred to other clinic, 6% referred to civilian provider, 79% letters/forms, 1% other CHAMPUS. The supplemental disposition of patients from the mental health/community mental health service was: 5% referred to other clinic, 1% referred to VA, 6% referred to civilian provider, 80% letters/forms. The supplemental disposition of patients from psychiatry was: 15% referred to other clinic, 17% referred to civilian provider, 27% letters/forms, and 16% home (non-military).

Place of Visit.

The place of visit for the psychology service included: 90% in clinic or office, 8% ward, and 1% telephone. The place of visit for the mental health/community mental health service was: 97% in clinic or office, 2% ward, and 1% telephone. The place of visit for psychiatry was 84% clinic/office, 10% ward, and 4% telephone.

SPECIAL PROGRAMS AND PSYCHOMETRIC ASSESSMENTS

Special Programs.

Special program assessments conducted by psychology were: 14 adoption, 19 Family Advocacy Program, 10 Exceptional Family Member Program, and 2 PRP. Special assessment programs conducted by mental health/community mental health service included: 215 Family Advocacy Program and 48 ADAPCP assessments. For psychiatry, 142 ADAPCP and 200 Family Advocacy Program assessments were performed.

Psychometric Assessments.

Psychometric assessments conducted by psychology included: 713 complete and 960 partial personality assessments, 409 complete and 287 partial intellectual assessments, 190 complete and 240 partial neuropsychological assessments, 80 complete and 274 partial other assessments. Assessments conducted by mental health/community mental health service were: 59 complete and 125 partial personality assessments, 94 complete and 15 partial intellectual, 18 complete and 19 partial neuropsychological assessments, 4 complete and 8 partial other assessments. For psychiatry, 4 complete and 9 partial personality assessments were performed.

PROVIDERS AND TIMES

Providers.

The patient workload in psychology was divided such that psychologists (48%) and specialists/technicians (38%) served as primary providers most often. The patient workload in mental health/community mental health service broken down for providers follows: specialist/technicians (49%), social workers (23%), and psychologists (19%). Secondary providers giving support for psychology occurred in only 18% of the encounters. The reasons for secondary providers were: teaching/supervision (69%) and procedure/treatment (18%). Secondary providers supporting mental health/community mental health services occurred in 5% of the encounters. The reasons for support included: teaching/supervision (34%), procedure/treatment (38%), and consultation (28%). Secondary providers giving support for psychiatry occurred in only 2% of encounters. There was generally no secondary provider in psychology, in mental health/community mental health services, or in psychiatry.

For psychology clinics encounters, providers were: psychologists (50%), specialists/technicians (32%). At mental health/community mental health service, providers were: specialists/technicians (47%), social workers (23%), and psychologists (19%). For psychiatry clinics encounters, providers were: psychiatrists (21%), child psychiatrists (6%), nurses (29%), non-psychiatric physicians (22%), and specialists/technicians (9%).

Provider Times.

The calculated average amount of time spent in a patient encounter in psychology was 78 minutes. The most frequently occurring categories (and percent of time occurring) were: 60 minutes (35%), 50 minutes (8%), and 30 minutes (7%). For a patient encounter at mental health/community mental health service was 59 minutes. The most frequently occurring categories (and percent of time occurring) were: 60 minutes (50%) and 45 minutes (14%). The average encounter at psychiatry took 53 minutes. The most frequently occurring times were: 60 minutes (40%) and 45 minutes (17%).

PROCEDURES AND DIAGNOSES

Procedures.

The most frequently rendered procedures by psychology services are:

- therapy, individual psychology
- interview, psychology
- testing, administration
- testing, scoring
- evaluation, functional symptoms
- assessment, behavioral
- evaluation, mental status
- diagnostic formulation
- history
- treatment recommendation/outcome
- testing, interpretation
- therapy, group, psychology
- treatment planning
- biofeedback

The most frequently used procedures by mental health/community mental health service include:

- therapy, individual, psychology
- interview, psychology
- therapy, individual, psychiatric
- evaluation, routine, psychiatric
- evaluation, mental status
- advice/health instruction
- therapy, couple/family, psychology
- history
- consultation limited
- evaluation, report composite
- testing, administration
- telephone consult (documented)
- therapy, group, psychology
- testing, scoring

The most frequently used procedures by psychiatry include:

- therapy, individual, psychiatric
- evaluation, routine, psychiatric
- telephone consult (documented)
- therapy, group, psychiatric
- collateral contact
- other psychiatric procedure
- consultation, limited
- evaluation, administrative, psychiatric
- therapy, marital/couple, psychiatric

Diagnoses.

The most frequently used diagnoses (combining both primary and secondary) reported by psychology include:

- diagnosis/condition defer axis I/II
- no diagnosis/condition on axis I/II
- psych factor affecting physical condition
- adjustment disorder w depressed mood
- personality disorder, atypical mixed/other
- marital problem
- adult antisocial behavior
- adjustment disorder with mixed emotional feature
- other interpersonal problem

The most frequently used diagnoses (combining both primary and secondary) reported by mental health/community mental health service were:

- no diagnosis/condition on axis I/II
- adjustment disorder with depressed mood
- diagnosis/condition defer axis I/II
- marital problem
- adjustment disorder with mixed emotional feature
- parent-child problem
- adjustment disorder with anxious mood
- other specific family circumstance
- phase life/circumstances problem
- uncomplicated bereavement
- other interpersonal problem
- occupational problem
- psychological factor affecting physical condition

The most frequently used diagnoses by psychiatry were:

- no diagnosis/condition on axis I/II
- diagnosis/condition defer axis I/II
- dysthymic disorder (depressive neurosis)
- adjustment disorder with depressed mood
- marital problem
- phase life/circumstances problem
- other specific family circumstances
- adjustment disorder with mixed emotional feature
- depression, major, single episode, unspecified
- depression, major, recurrent, unspecified
- occupational problem
- anxiety disorder, generalized
- parent-child problem

MANAGEMENT CONSIDERATIONS

The traditional method, of tallying "Clinic visit" frequencies and of reporting these for justification of manpower requirements, is recognized as inadequate to account for the actual work being accomplished. For resource utilization review and program evaluation purposes, the historical "nose count" methods have fostered over the years an emphasis on what has been termed, "Task-centered" and "Custodial" management styles that are concerned mainly about issues of production and the safeguarding of acquired assets. While these techniques were the "state of the art" in health review systems two decades ago, methodological advancements are now on the scene to accommodate current "People-centered" and "Participative" management trends inherent in this quality of care assurance era.

In the past, chiefs of outpatient services have had to rely solely on methods which involved rather narrow-focused and simplistic "work unit" tabulations both to monitor effectiveness of mission and function attainment and to justify personnel strength. Unless "in-house" studies were done locally to explore the nature of work-site patient characteristics and procedural activities, these chiefs had little opportunity to attend to the management issues inherent in the provisions of clinical services. Rarely has there been an occasion for managers to employ a standardized method of study to identify client population or referral source needs and to scrutinize direct care procedure requirements. Managers have generally lacked sufficient data to formulate or substantiate responsive clinic operations, staff dispersal, and technical training programs, policies, and direction.

As can be gleaned from the sample trend data reported here, the Ambulatory Care Data Base study provides clinical directors and service chiefs a management tool with broad-scoped potential. The acquired data base allows for a multitude of item combinations and permutation analyses to retrospectively describe and account for both particular section and provider patient care activities.

Finally, we have had little or no way to systematically estimate the operational impact of prospective programs. Every service chief is familiar with those circumstances wherein additional program tasks are projected to be assigned to a section and available resources are already committed, "stretched to the maximum." Changes in program priorities create fluctuation demands within services and personnel. The information available from the Ambulatory Care Data Base can also be used for more factually projecting resource needs to accommodate program creations and tasking.

As a brief example, data is retrievable on the average times for specific procedure, service and evaluation; for appointment type; for primary and secondary provider involvement; for global and earmarked referral source activities; for special program collaboration; and for specific patient diagnostic conditions. This and other types of available information can easily be used to summarily compute impact predictions of various new or altered programs upon a clinic. If the plan under consideration was to commence direct-care, clinical psychological consultative and treatment support to a particular surgical service, the manager would be able to enter the data base for Clinical Psychology Service and extract past data referencing referrals from surgical services. The manager could ostensibly further specify his focus to include discrete or clustered physical disease diagnoses involving surgery and/or mental disorder diagnoses of these surgical patients.

As an alternate approach, the manager could define from the provided procedure menu those activities involved in customary and usual care for a specific patient condition. (Literature describing an existing surgical support program by psychology could be reviewed for determining that which is "customary and usual.") The data base then allows for tabulation of inclusive time and provider resources for the proposed program.

Issues Regarding Privileged Communication and Confidentiality
for Military Psychologists

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ABSTRACT

Federal Statutes and Service Regulations govern the functioning of military psychologists. Effective August 1988 all military psychologists will be required to maintain an active state license. All 50 states adhere to the Ethical Principles of the American Psychological Association. Potential conflicts exist between Federal Statute, Service Regulations, and the Ethical Principles of the APA. The principal area of conflict may be with confidentiality of information obtained by psychologists from consumers. Thirty active duty Army Medical Department (AMEDD) psychologists were surveyed on current practices regarding confidentiality. Twenty-four (80%) responded. Results suggest that most AMEDD psychologists (21 respondents or 87.5%) do not document in writing that they have informed consumers of the limits of confidentiality of psychological information. Nor do they obtain written permission before releasing information on consumers when requested by unit commanders. Military psychologists are encouraged to advise consumers in writing of the limits of confidentiality of psychological information prior to initiating any professional relationship. The integration of the APA Code of Ethics with Federal Statute and Service Regulations is an area which mandates additional study so as to assist military psychologists to legally and ethically provide diagnostic and therapeutic services to consumers.

INTRODUCTION

Confidentiality of communication between a psychologist and a consumer of psychological services has been protected, at least in part, because of potential sanctions against one's license. This has not been the case for those in exempt agencies. Military psychologists, for example, are governed by federal statutes and service regulations. Effective August 1988, those providing patient care are required to maintain an active license in one of the 50 states. These mandated licensure requirements apply to active duty, civilian federal civil service, foreign national, contract, Reserve components, and Ready Reserve of the National Guard personnel. (Department of Defense Directive No. 6025.6, July 18, 1985, Subj: Licensure of DOD Health Care Providers).

All 50 states adhere to the Ethical Principles of Psychologists adopted by the American Psychological Association (APA, 1981). Failure to adhere to these principles by a state-licensed psychologist, even if the individual is not a member of the APA, can result in a restriction and/or loss of license, (e.g.), General Ruling 461.3, Rules and Regulations of the Texas State Board of Examiners of Psychologists, December, 1986; Section 23.(a)(5), Texas Psychologists' Certification and Licensing Act, 1985). For military psychologists or other health care professionals restriction and/or loss of license could serve as grounds for decertification and reclassification into another job specialty. Depending on the severity of the issue, it could also serve as the basis for loss of commission and consequently loss of seniority, retirement, and medical benefits.

This paper highlights relevant material regarding confidentiality from federal statutes and Army regulations (Navy and Air Force regulations are similar), the Ethical Principles of Psychologists (APA, 1981; see Enclosure 1 for selected highlights), and the Specialty Guidelines for the Delivery of Services (APA, 1981a; see Enclosure 2 for selected highlights). It also presents a pilot study of current clinical practices followed by uniformed AMEDD psychology health care providers. Recommendations are proposed to assist uniformed psychologists in adhering to APA standards, service regulations, and federal statutes.

Federal Statutes and Military Regulations Relevant to Confidentiality and Disclosure

Title 5 U.S.C. 552a(b)(1) (1982) Conditions of Disclosure states "No agency shall disclose any record which is contained in a system of records by any means of communication to any person, or to another agency, except pursuant to a written request by, or with the prior written consent of, the individual to whom the record pertains, unless disclosure of the record would be - (1) to those officers and employees of the agency which maintains the record who have a need for the record in the performance of their duties," DD Form 2095

(Privacy Act Statement) implements Title 5 U.S.C. 552a (The Privacy Act). It identifies eleven conditions or exceptions to the general rule that information will not be released without prior written consent of the patient. These potential recipients of information include those with a need for the information, when required by law, to provide research and statistical data, to commanders, to the Veterans Administration for follow-up care, to either House of Congress, and others specified in the act.

Para 3-2a, AR 340-21 (The Army Privacy Program) states that disclosure of records may be made without the individual's consent "to those officials and employees of the Department of Defense who have a need for the record in the performance of their duties and their use is compatible with the purpose for which the record is maintained."

Enclosure 1 to Appendix D (Privacy Act Statement, Health Care Records) to HSC Supplement 1 to AR 340-21 (The Army Privacy Program) addresses authority for collection of information including social security number and states, "in the case of active duty military personnel, disclosure of requested information is mandatory. In the case of all other personnel/beneficiaries, disclosure of requested information is voluntary."

Title 42 U.S.C. 408(b) (1982) Confidentiality of Alcohol and Drug Abuse Patient Records states that patient records "may be disclosed without the individual's consent as follows: (A) To medical personnel to the extent necessary to meet a bona fide medical emergency. (B) To qualified personnel for the purpose of conducting scientific research, management audits, financial audits, or program evaluations (C) If authorized by an appropriate order of a court of competent jurisdiction granted after application showing good cause therefore."

Army Regulation (AR) 40-42 (Policy on Confidentiality of Medical Information, dated 24 July 1974) "defines Department of Army policies and procedures of private medical information within the Department of Army ..." Para 2b states "private information disclosed as a result of an evaluation/treatment relationship is considered to be confidential and should not be divulged except when required by other AMEDD health personnel for patient care or by responsible officials on a need-to-know basis. Medical confidentiality is not a basis for refusing to divulge such information when there is an official need-to-know or release is required by law or regulation." Para 4a states "in those circumstances when, for the good of the individual and/or the Army community, medical information is required by personnel with an official need-to-know, it will be provided."

Para 2-2c, AR 40-66 (Medical Record and Quality Assurance Administration, dated 15 December 1981) states that "information disclosed by patients to AMEDD health personnel is not privileged."

The Manual for Courts-Martial United States, 1984 Military Rules of Evidence 501(d) states, "Notwithstanding any other provision of these rules, information not otherwise privileged does not become privileged on the basis that it was acquired by a medical officer or civilian physician in a professional capacity."

This is not intended to be a comprehensive review of Army regulations addressing this issue. It is included only to demonstrate the multiple exceptions to confidentiality which exist for uniformed services health care providers.

Relevant Literature

In spite of a recent marked rise in professional and public awareness of ethics and law, little is known about the actual ethical situations faced by providers of psychological services. (Haas, Malouf, & Mayerson, 1986). Tymchuk and associates recorded that 58% of psychologists do not feel "well informed enough about ethical issues in psychology." (Tymchuk, et al., 1982, p. 419). Schwitzgebel and Kirkland found most ethical codes to be "vaguely formulated and rarely enforced They provide almost no specific and tangible guidance to either practitioner or scientist." (1980, p. 3).

Graduate schools do not appear to emphasize training in ethics. Haas, Malouf, and Mayerson (1986) found in a survey of 500 members of Division 29 (psychotherapy) of APA that the mean for formal graduate ethics education was 11.5 hours but the mode was zero! In a survey of 600 interns at 106 APA-approved internships in professional psychology (39.2% return rate) Baldick (1980) reported that 17% had no training in ethics during their graduate education and 21% had less than 5 hours. Baldick found that ethics training significantly increased interns' scores on an Ethical Discrimination Inventory. These data suggest a need for increased training on ethics, that benefit can accrue from such training, and that further research be conducted to improve understanding in this area.

Haas, Malouf, and Mayerson (1986) demonstrated that there is little consensus regarding ethical decision making to include the issue of confidentiality. This may reflect the observation of experts in moral development that moral cognition can lead to divergent moral action (Blasi, 1980). It is important to promote both the process of thinking of ethics and the behaviors of acting so.

Teaching ethics only in the context of supervision does not guarantee depth or breadth of understanding. Maximum ability to conceptualize ethical issues will most likely occur if ethics courses are developed from theory and application (Abeles, 1980; Handelsman, 1986; Keith-Spiegel & Koocher, 1985; Solomon, 1984; Tymchuk, 1981).

Several investigators have documented that some, perhaps many, clinicians behave unethically (Butler & Zelen, 1977; Hall & Hare-Mustin, 1983; Holroyd & Brodsky, 1977; Pope, Levenson, & Schover, 1979). Bernard and Jara (1986) demonstrated a gap between what one should do versus what one would do when made aware of an ethical dilemma. This has been observed by others (Butler & Zelen, 1977). Bernard and Jara (1986) concluded that the problem is not only how to communicate ethical principles more effectively, but also how to motivate others to implement them.

Increasing concern with the rights of mental health consumers (Adams & Orgel, 1975; Coyne & Widiger, 1978; Eberlein, 1977) and increasing judiciary involvement in this area (Bersoff, 1975; Brooks, 1974; Miller, Brodsky, & Bleachmore, 1976; Redlich & Mollica, 1976) mandate greater attention by providers to ethical/legal concerns. Hare-Mustin and her colleagues believe that it is especially important for therapists to protect clients' rights because of the "help-seeking" (versus "self-protective") posture with which clients enter a therapeutic relationship (Hare-Mustin, et al., 1979, p. 4). They reason that most clients neither know their rights nor are in a good position to protect them when they enter treatment. Consequently, therapists must assume responsibility for so advising clients. Such actions protect the practitioner both ethically and legally (Rosten & Sherrer, 1973).

Studies have documented that psychologists believe confidentiality is an important element of the therapeutic process (e.g., Jagim, Wittman, & Noll, 1978). In a national survey of Division 29 members, Haas, Malouf, and Mayerson (1986) found confidentiality to be of more frequent concern than any other ethical area. It was rated the second most serious issue after sexual misconduct of colleagues. Nevertheless, many psychologists are not fully aware of their ethical and legal obligations on this subject (Jagim, et al., 1978; Swoboda, Elwork, Sales, & Levine, 1978; Tancredi & Clark, 1972). Most psychologists do not appear to discuss confidentiality with consumers (Faustman, 1982) in spite of the clear limitations that exist as determined by state law (e.g., Green, 1980), legal precedent (e.g., Tarasoff v. Regents of University of California, et al.) and APA Guidelines (e.g., Principle 5 (introductory statement) APA, 1981).

Psychologists cannot guarantee confidentiality (although some would like to do so, e.g., Siegel, 1976) to consumers and remain within the requirements of the law (DeKraai & Sales, 1984). Offering consumers absolute confidentiality may promote more open disclosure (Haut & Muehleman, 1986; Woods & McNamara, 1980), but this is unrealistic in the current legal arena (Appelbaum, Kaper, Walters, Lidz, & Roth, 1984). Some have suggested that the inability to guarantee confidentiality will cause consumers to be less trusting of providers and more hesitant to seek help (Jagim, Wittman, & Noll,

1978), while others suggest there is no decrease in disclosure when limits of confidentiality are clearly and accurately described (Haut & Muehleman, 1986; Muehleman, Pickens, & Robinson, 1985; Kobocow, McGuire, & Blau, 1983).

It is important to understand consumers' beliefs on the subject. Miller and Thelen surveyed 612 former consumers and nonconsumers of psychological services. They found that 69% of all respondents "believed that everything discussed in the context of psychotherapy is considered confidential by psychologists" (Miller & Thelen, 1986, p. 15). Almost all (97%) wanted to be advised of limits of confidentiality. They concluded that "the vast majority of the respondents view confidentiality as an all-encompassing, superordinate mandate for the profession of psychology" (Miller & Thelen, 1986, p. 18). It is APA policy that consumers be advised in advance of any limits of confidentiality (APA, 1981a).

Many have concluded that psychologists should inform consumers of limits of confidentiality prior to beginning evaluative and/or treatment procedures. (APA, 1981a; Everstine, et al., 1980; Noll, 1974; Siegel, 1979). Noll (1974) has expressed the opinion that psychologists have a moral and ethical obligation to so advise patients. Failure to so advise patients has been viewed as "deceptive and unethical" (Stanczak, Bolter, & Bernard, 1982, p. 73), and can result in a reprimand from APA (Enclosure 3). Such actions by a therapist may demonstrate respect for the consumers' autonomy and facilitate the therapeutic relationship. (Everstine, et al., 1980; Rosen, 1977). Muehleman, Pickens, and Robinson (1985) hypothesized that the therapist who creates an atmosphere of trust and self-disclosure such as described by Carkhuff and Berenson (1977) may override any inhibitory effect created by advising clients of limits of confidentiality. This has not been demonstrated empirically (Haut & Muehleman, 1986).

As clarified by Hays "confidentiality refers to information obtained in confidence, as between a psychotherapist and a patient. Revealing such information without the patient's permission is a breach of confidentiality" (Hays, 1981, p. 914). Blau (1984) defined confidentiality as "the professional's obligation never to reveal information obtained in the professional relationship without specific permission from the client" (Blau, 1984, p. 329). This is different than privileged communication, a legal concept, which defines conditions under which a psychologist can and cannot reveal information obtained from patients during professional contacts. Privilege deals with admissibility of information in a court of law. According to Blau, "the ethical constraint against revealing confidential information is almost absolute, allowing only the leeway of revealing a confidence in the duty to warn where danger to self is predicted" (Blau, 1984, p. 329). Confidentiality was considered

absolute when the APA developed its Code of Professional Ethics (Shapiro, 1984).

Clients may be wisely advised to exercise caution in waiving their right to privacy by entering into therapeutic relationships with psychologists and other health care providers (Everstine, et al., 1980). Noll (1981) reasoned that providers must educate consumers regarding consent to treatment. It is unacceptable to "discuss with the client areas of potential harm after the therapist receives a request for information, since in most instances the client has already incriminated himself or herself, perhaps on some application or release-of-information." (Noll, 1981, p. 916). APA agrees. (APA, 1981a). An issue easily overlooked by providers is their use of diagnostic labels. If DSM-III or some other nosological system is to be employed by the provider, the client should be informed and advised that untoward consequences may result from psychiatric and/or psychological labeling (Smith, 1981). "Unless and until clients are fully informed about these privacy-confidentiality risks and their genuine potential consequences, such phrases from the APA Code of ethics as "respect for the dignity of the client," "promote the autonomy of the client," and "avoidance of fraud and duress" will remain empty ones, and psychotherapists will remain liable for negligence." (Noll, 1981, p. 916).

There appears to be a trend in legislation and regulation toward requiring psychotherapists to serve as gatekeepers by saddling them with reporting requirements for certain kinds of crimes. When does a patient's confession to a psychotherapist cause the patient to forfeit any claim for help? "When does the healer become the informer?" (Everstine, et al., 1980, p. 839). Psychologists must be increasingly attentive to laws and regulations preserving privacy and confidentiality as well as those mandating that these conditions be breached. For example, psychologists have both a "duty to warn" patients of any limits of confidentiality as well as a "duty to report" in situations such as suspected child abuse and/or neglect. Psychologists are well advised to carefully attend to the informed consent process prior to initiating a professional relationship with a patient. As suggested by Everstine, et al. (1980), when a client obtains consent.

An important component of advising patients of limits of confidentiality is the context in which this advice is provided. Research suggests that most people demonstrate obedience when in the presence of authority figures (Milgram, 1964). Providers must carefully attend to the process of informing consumers of limits of confidentiality to ensure that their authority does not produce compliance without understanding (Rosen, 1977). The provider's primary goal during this process should be to ensure that consumers comprehend potential consequences of psychological consultation. An attempt to maximize compliance without understanding is unethical.

case for current use of DD Form 2005, The Privacy Act Statement, is to engage in a self-defeating and meaningless exercise. Consumers must comprehend as fully as possible limits of confidentiality and consequences which may occur as a result of these limitations.

In accordance with Principle 8a of the APA ethics code, limits of confidentiality documents should be written in language that the consumer can understand (APA, 1981). Readability does not guarantee understanding but it does promote the potential for understanding. In developing limits of confidentiality statements it is probably best to underestimate rather than overestimate the reading ability of consumers (Handelsman, Kemper, Kesson-Craig, McLain, & Johnsrud, 1986).

Miller and Willner (1974) proposed that consent forms be two-part documents. They believe that Part I, the Consent Form, should be followed by a series of questions which assess understanding of that form. They see health care professionals as ethically responsible to ensure patient understanding and believe this is best facilitated through their proposed two-part document.

The military psychologist must be continuously cognizant of multiple ethical issues regarding confidentiality. A growing number of third parties may have access to the their clinical case files. These may include receptionists, secretaries, behavioral science specialists, psychological assistants/associates, auditing officials, supervisors, and members of the chain of command. Not only should limits of confidentiality be discussed with patients in advance, but also care should be taken to ensure that information is not released indiscriminantly. It is the provider's responsibility to advise the consumer of potential implications resultant from release of information in clinical case notes/files. Requests for release should be carefully analyzed and providers should demand that third parties make requests as specific as possible. In general, requests for release of entire clinical case files should be viewed with extreme caution. Third parties should be required to limit their requests to specific information for specific reasons.

METHOD

Thirty Army psychologists were surveyed by mail in a pilot study designed to investigate clinical practices associated with patient care and the confidentiality of psychological information. This brief survey was developed to determine if problems of confidentiality potentially existed for military psychologists in their clinical practice. Respondents were asked to provide the following demographic data: age, sex, highest level of education, and military rank. They were asked whether they advised patients of limits of confidentiality and if they documented this in writing. They were also asked how they would resolve one common and one uncommon ethical dilemma dealing with

confidentiality. This study was approved by the Clinical Investigation and Human Use Committees, William Beaumont Army Medical Center, El Paso, Texas.

RESULTS AND DISCUSSION

Twenty-four (80%) of the psychologists surveyed responded to the questionnaire. All but one had completed a doctoral degree in psychology and held the 68S specialty skill indicator indicative of qualification as an AMEDD psychologist. All had completed an internship in professional psychology. Subjects averaged 34.8 years in age (range = 28 to 41). Twenty-two of the respondents were male and two were female.

Eight (33.3%) respondents indicated that they always informed patients of limits of confidentiality of psychological information, but only three (12.5%) documented this in writing. Seven (29.2%) obtained written permission from active duty patients before releasing information on them when requested by unit commanders. Thirteen (54.2%) stated that they rarely or almost never obtained written permission from active duty patients before releasing information to commanders. Twenty-three (95.8%) discussed patients seen with other members of the hospital staff, but only eight (33.3%) obtained written permission from patients before releasing information on them when requested by other members of the hospital staff involved in their care. Release of information to commanders and hospital staff without prior authorization is not only allowed, but mandated by service regulations. And it violates the APA Code of Ethics to do so without the patient's consent.

Seventeen (70.8%) respondents stated that they rarely or almost never noted that their psychological reports contained private information.

Eleven (45.8%) respondents stated that when confronted with a conflict between Army regulations and APA standards or ethical principles, that they would attempt to resolve the conflict, but ultimately adhere to Army regulations. Ten subjects (41.7%) stated that they would adhere to APA standards and ethical principles. The remaining three subjects (12.5%) stated that they would deal with such an issue on a case by case basis depending upon the situation.

The common ethical situation presented in the survey dealt with a self-referred adult male with symptoms of anxiety and depression who was seen by a psychologist for evaluation and treatment. The unit commander had recently learned that the psychologist was seeing the patient (an active duty member) and telephoned to request information about the patient. Eleven (45.8%) respondents stated that they would confirm the fact that they were seeing the active duty service member, but refuse to provide additional information until obtaining a release

from the service member. Health care providers are required to inform unit commanders, when asked, if members of their command are being seen for evaluation and/or treatment. Military health care providers are not required to disclose the nature of that treatment without a formal request from the unit commander and/or a release of information from the patient. Eight (33.3%) respondents stated that they would refuse to provide any information to the commander without obtaining a written release from the service member. This response may reflect what these psychologists believe they should do in the situation to conform to APA standards. It does not accurately represent what these providers are required to do to adhere to military regulations. It is quite probable that what these providers should do, or feel they should do, does not accurately reflect what they actually would do in the situation.

Subjects were also asked to respond to one uncommon ethical dilemma dealing with confidentiality. A 25 year old self referred patient informed the psychologist provider on the 14th treatment session that she was dependent on Xanax and was exchanging sex with a physician member of the hospital staff for this medication. Ten (41.7%) respondents stated that they would immediately report this through the chain of command to the hospital commander. While this may deal with the well known mandate to "keep the commander informed," it is a violation of confidentiality (APA, 1981). Three (12.5%) respondents stated that they would discuss this matter with the alleged physician and insist that he take corrective action to end the problem. This action also violates the patient's confidentiality. Four (16.6%) respondents stated that they would respect the confidentiality of the patient (inform no one about the matter) and use this information as an issue of treatment to be resolved during the treatment process. This course of action adheres to the ethical standards of confidentiality of APA, 1981, but could subsequently create substantial difficulties for the psychologist provider with the chain of command. One respondent opted to refer the patient to the appropriate local drug and alcohol facility. Some might consider this both a violation of confidentiality and patient abandonment. One respondent elected to refer the patient to a provider outside the military system. Three respondents decided to check with their local legal authority to receive guidance on how to handle the matter.

The major findings of this study were the following:

1. It appears that most AMEDD uniformed psychologists do not document in writing that patients seen by them have been advised of limits on confidentiality of psychological information.
2. It appears that few AMEDD uniformed psychologists obtain a written permission from patients before releasing information when requested by unit commanders.

3. It appears that few AMEDD uniformed psychologists obtain written permission from patients before releasing information on them when requested by other members of the hospital staff involved in their care.

4. It appears that almost no AMEDD uniformed psychologists document on their psychological evaluations that the report contains private information.

5. It appears that AMEDD uniformed psychologists appear fairly evenly split between adherence to Army regulations or APA standards and ethical principles when they are confronted with a conflict between the two.

6. It appears that a surprisingly high number of respondents fail to understand that they are required by Army regulation to confirm to unit commanders, when asked, if a particular service member is or is not being seen in their treatment facility.

7. When confronted with an uncommon and difficult ethical dilemma, it appears that a significant number of AMEDD uniformed psychologists would violate the confidentiality of the patient. Such actions violate APA standards and subject these officers to possible disciplinary action by the APA Ethics Committee (APA, 1981; Ethics Committee of the American Psychological Association, 1985).

RECOMMENDATIONS

1. All consumers (to include active duty) seen by uniformed services psychologists should be advised of limits of confidentiality of psychological information (Enclosure 4). This should be done prior to beginning any clinical contact with a patient (1st session/intake), and documented in writing. The readability of the enclosed limits of confidentiality statement is equivalent to grade level 8 (Fry, 1968, 1977).

2. Since, in the military, the term "confidential" is a Department of Defense information classification, "privileged" a legal term, and "safeguarded" a special document classification, psychological reports should include the term "private" i.e., "The contents of this report should be considered private since it contains psychological information relating to (name of patient)."

3. All psychologists, to include psychology interns, entering the uniformed services should be provided with a block of instruction on conflicts presented by service regulations and APA standards, i.e., there is no confidentiality (service regulations) v. the mandate that psychologists respect confidentiality of consumers (APA). This should be presented at internships and basic/advanced officer service schools and include both theory and application. Cases such as are outlined

in the Ethics Discussion Paper (Enclosure 5) should be employed to facilitate understanding of how to integrate APA standards with service regulations. Additionally, these documents should be made available to consultants to assist them in orienting psychologists newly assigned to their region/command.

4. Workshops should be presented at the annual APA convention which address ethics and the military. These should be sponsored by Division 19, and include uniformed psychologists as well as prominent members of the APA who are knowledgeable of both the military and the ethical principles of psychologists.

5. Providers should be educated on the importance of carefully monitoring the release of information process. Securing a release of information is but the first step. The provider is responsible to ensure that the consumer understands possible adverse effects of releasing information. Information should not be routinely released. Rather, providers should ask consumers to specify the information to be disclosed. This process should be documented in writing in the consumer's chart.

6. A tri-service ad hoc committee of Division 19, APA should be formed and tasked with continuing to study confidentiality as a problem within the uniformed services. The general conclusion from empirical research suggests that utilization of psychological services and the therapeutic relationship is enhanced when clients are guaranteed increased confidentiality. This committee should attempt to influence revision of identified service regulations having probable untoward impact on the professional functioning of tri-service providers of psychological services.

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Legal Citations

- ¹Tarasoff v. Regents of University of California, et al., 13 Cal. 177, 17 Cal 3d 425, 551 p. 2d 334, 131 Cal. Rptr. 14 (1976).
- 5 U.S.C. Section 552a(b)(1) (1982)
- 42 U.S.C. Section 408(b) (1982)

ENCLOSURE 1

Selected Ethical Principles of Psychologists

Principle 3d (Moral and Legal Standards). "In the ordinary course of events, psychologists adhere to relevant governmental laws and institutional regulations. When federal, state, provincial, organizational, or institutional laws, regulations, or practices are in conflict with association standards and guidelines, psychologists make known their commitment to association standards and guidelines and, wherever possible, work toward a resolution of the conflict." (APA, 1981, 634).

Principle 5 (Confidentiality). "Psychologists have a primary obligation to respect the confidentiality of information obtained from persons in the course of their work as psychologists. They reveal such information to others only with the consent of the person or the persons' legal representative, except in those unusual circumstances in which not to do so would result in a clear danger to the person or to others. Where appropriate, psychologists inform their clients of the legal limits of confidentiality." (APA, 1981, 635-6).

Principle 5a "Information obtained in clinical or counseling relationships or evaluative data concerning children, students, employees, and others, is discussed only for professional purposes and only with persons clearly concerned with the case. Written and oral reports present only data germane to the purposes of the evaluation, and every effort is made to avoid undue invasion of privacy." (APA, 1981, 636)

Principle 5b. "Psychologists who present personal information obtained during the course of professional work in writings, lectures, or other public forums either obtain adequate prior consent to do so or adequately disguise all identifying information." (APA, 1981, 636)

Principle 5c. "Psychologists make provisions for maintaining confidentiality in the storage and disposal of records." (APA, 1981, 636).

Principle 5d. "When working with minors or other persons who are unable to give voluntary, informed consent, psychologists take special care to protect these persons' best interests." (APA, 1981, 636).

Principle 6 (Welfare of the Consumer). "Psychologists respect the integrity and protect the welfare of the people in groups with whom they work. When conflicts of interest arise between clients and psychologists' employing institutions, psychologists clarify the nature and direction of their loyalties and responsibilities and keep all parties informed of their commitments. Psychologists fully inform consumers as to the purpose and nature of an evaluative, treatment, educational, or training procedure, and they freely acknowledge that

clients, students, or participants in research have freedom of choice with regard to participation." (APA, 1981, 636).

Principle 6b. "When a psychologist agrees to provide services to a client at the request of a 3rd party, the psychologist assumes responsibility of clarifying the nature of relationships to all parties concerned." (APA, 1981, 636).

Principle 6c. "Where the demands of an organization require psychologists to violate these ethical principles, psychologists clarify the nature of the conflict between the demands and these principles. They inform all parties of psychologists' ethical responsibilities and take appropriate action." (APA, 1981, 636).

ENCLOSURE 2

Specialty Guidelines*

Guideline 2 (Programs). 2.2.2 "All providers within a clinical psychological service unit support the legal and civil rights of the users ... they are continually sensitive to the issue of confidentiality of information and short-term and long-term impact of their decisions and recommendations, and other matters pertaining to individual, legal, and civil rights. Concerns regarding the safeguarding of individual rights of users include, but are not limited to, ... information relative to adverse personal actions in the armed services," (APA, 1981a, 645).

2.3.5 "Providers of clinical psychological services maintain a system to protect confidentiality of their records." (APA, 1981a, 646).

"The clinical psychologist does not release confidential information, except with the written consent of the user directly involved or his or her legal representative. Even after consent for release has been obtained, the clinical psychologist clearly identifies such information as confidential to the recipient of the information. If directed otherwise by statute or regulations with the force of law or by court order, the psychologist may seek a resolution to the conflict that is both ethically and legally feasible and appropriate." (APA, 1981a, 646-7).

"Users are informed in advance of any limits in the setting for maintenance of confidentiality of psychological information. For instance, clinical psychologists in hospital, clinic, or agency settings inform their patients that psychological information in a patient's clinical record may be available without the patient's written consent to other members of the professional staff associated with the patient's treatment or rehabilitation." (APA, 1981a, 647).

"When the user's intention to waive confidentiality is judged by the professional clinical psychologist to be contrary to the user's best interests or to be in conflict with the user's civil and legal rights, it is the responsibility of the clinical psychologist to discuss the implications of releasing psychological information and to assist the user in limiting disclosure only to information required by the present circumstance." (APA, 1981a, 647).

"Raw psychological data (e.g., questionnaire returns or test protocols in which a user is identified are released only with the written consent of the user or his or her legal representative and released only to a person recognized by the clinical psychologist as qualified and competent to use the data." (APA, 1981a, 647).

"Providers of clinical psychological services remain sensitive to both the benefits and the possible misuse of information regarding individuals that is stored in large computerized data banks. Providers use their influence to ensure that such information is used in a socially responsible manner." (APA, 1981a, 647).

ENCLOSURE 3

Attached is a summary of correspondence between the Administrative Officer for Ethics, American Psychological Association, and a military psychologist. Subject deals with confidentiality of psychological information. The military psychologist was accused by a patient of violating confidentiality by responding to a request from command for information on that patient. The military psychologist was officially reprimanded by APA for failing to document, in writing, that the patient was advised in advance of limits of confidentiality. The patient had been so advised, but this was not documented in the medical record or clinical case file.

1. Attachment 1 is a letter from the administrative officer for ethics, APA, asking a military psychologist to respond to an ethical complaint.
2. Attachment 2 is the response from the accused military psychologist to the Administrative Officer for Ethics, APA.
3. Attachment 3 is a letter from the Administrative Officer for Ethics, reprimanding the military psychologist.
4. Attachment 4 is a letter from the OTSG Psychology consultant which cites Army regulations that permit release of information without a patient's signature.
5. Attachment 5 is a letter from the reprimanded military psychologist to the President of Division 19 asking for specific guidelines regarding confidentiality and release of information for military psychologists.

Division 19 was made aware of this and potential problems regarding confidentiality and release of information in 1981. Since that time nothing has been done by Division 19 to provide guidance to uniformed psychologists regarding this subject. It is highly probable that a significant number of military psychologists are releasing information to commanders, hospital staff, and others without written consent from consumers. If this is, in fact the case, then these individuals are subject to reprimand by the Ethics Committee, APA

*Material has been deleted in an effort to highlight the most salient features of this case.

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January 22, 1980

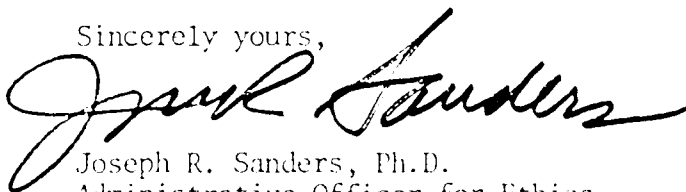
CONFIDENTIAL

Dear Dr.

Enclosed is a letter dated November 23, 1979 sent to our Association's Ethics Committee by Captain [redacted]. That letter accuses you of violating Principle 5 of our Association's Ethical Standards of Psychologists. A copy of those Standards is enclosed. I have shared Captain [redacted] letter with the Chair of our Committee and together, we agree that there is a possible violation of Principle 5 if accusations are true. Accordingly, we have no recourse but to share this letter with you and ask that you give your side of this story. That request is being made consistent with Principle 7.h also of the enclosed Ethical Standards. In other words, whenever a member is accused of violating one or more principles of the Ethical Standards and a check by the Chair and Secretary of the Ethics Committee indicates that the complaint is consistent with at least one of the APA Ethical Standards' principles, we must submit the complaint and the response of the complainee to the entire Ethics Committee.

We would like to share your response to this complaint with the Ethics Committee at the latter's February 22-23, 1980 meeting. Accordingly a response prior to that date in writing would be greatly appreciated.

Sincerely yours,



Joseph R. Sanders, Ph.D.
Administrative Officer for Ethics

JRS:sm

19 February 1980

Joseph R. Sanders, Ph.D.
Administrative Officer for Ethics
American Psychological Association
1200 Seventeenth Street, N.W.
Washington, D.C. 20036

Dear Dr. Sanders,

I have recently received your correspondence of 22 January 1980 which was forwarded to me from my prior duty station in In
response, the following information is provided:

- 1) Cpt [redacted] was referred to me on an emergency basis by his supervisor, Cpt [redacted]. This referral was made because Cpt [redacted] had verbalized to Cpt [redacted] that he was thinking about committing suicide during the forthcoming weekend.
- 2) In this initial meeting we did indeed discuss confidentiality. I explained to Cpt [redacted] that I was required to keep a clinical record on all of my patients, this being dictated by both Army and JCAH regulations. I informed him that what I put in the chart would be pertinent to the problems that he expressed, and would assist the psychologist who was to replace me in understanding his (Cpt [redacted]'s) problems. I was scheduled to depart in eight weeks, with no overlap time between my departure and my replacement's arrival. Finally, I related to Cpt [redacted] that I could not guarantee confidentiality of these materials for two reasons: a) the provisions of the Army's Privacy Act Statement (DD Form 2005) which in part states: "... the uses of this information are to: ... conduct lawful investigations ... determine suitability of persons for service or assignments..." I have been in the Army since 1973 and have never deviated in providing accurate information regarding confidentiality. I am extremely cognizant that the Army's Privacy Act does not guarantee confidentiality. Cpt [redacted] was fully aware of the confidentiality constraints of the Privacy Act, as our initial discussion focused on these issues. b) Secondly, upon my departure from [redacted], my patients' charts remain at the clinic. They are kept in locked file cabinets, in secured offices. They are separate from all other medical records, and are accessible only to the P&M staff. However, if a psychiatric evaluation is requested by a soldier's chain of command, such a report will be provided by the Chief, Outpatient Psychiatry Clinic. These reports typically have minimal identifying information, but they do have a DSM II diagnosis and recommendations for assisting the soldier in making adjustment to the military. It would have been an established practice to utilize my therapy notes in making such a report if one was made.

AD-A193 151

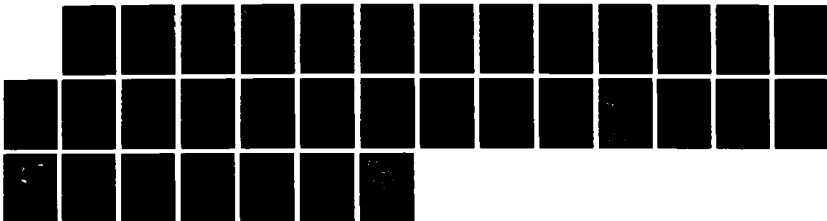
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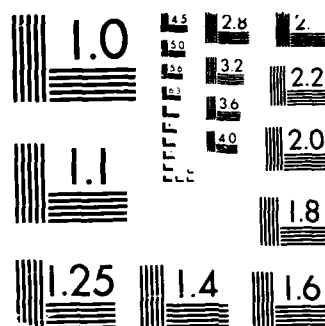
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MICROCOPY RESOLUTION TEST CHART
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Reference is made to paragraph 3- Cpt [redacted] was very suicidal when I initially interviewed him. It was only after talking to him for about two and a half hours that I decided not to hospitalize him. In the Army, psychiatric hospitalization is not^a subject with which the patient must agree. If there is a genuine reason for hospitalization, if the patient is felt to be a danger to himself or others, then he can be admitted whether he desires this or not. In part, my decision not to have Cpt [redacted] hospitalized was based upon my concern as to how this might affect his career. Hospitalization would have drawn considerable command attention to him, and would have involved others beyond Cpt [redacted]. However, at no time have I ever told anyone in the military that in order to protect their career I would not keep a record or provide a psychiatric evaluation when requested by a commander.

Cpt [redacted] is fully aware of the provisions of the Privacy Act. Cpt [redacted] sent soldiers to me who were required to have psychiatric evaluations by their commanders. Some of these soldiers related to me that Cpt [redacted] said to them "if you don't tell Cpt [redacted] anything, then he can't write anything".

It is important to point out that Cpt [redacted] became an issue to his command not because he had been a psychiatric patient, but because he had been acting exceedingly inappropriately in [redacted] to the point that [redacted] had to verbally admonish him and report him to his supervisors. He had been shifted from one position to another in an effort to assist him in making an adequate adjustment to the military, but he nevertheless continued to be a source of embarrassment to [redacted]. His separation from service was not based upon his psychiatric care/ records/ or lack of confidentiality, but upon substandard duty performance.

In summary, Cpt [redacted] was advised of the limits of confidentiality within the military, and was advised that I would be keeping a clinical record. At each visit to the clinic, when Cpt [redacted] announced himself to the secretary, the secretary would first pull his clinic chart and then call me. It is my habit to obtain the chart from my secretary and then to meet my patient with their chart in my hand.

Enclosed is a copy of the Army's Privacy Act Statement.

If I may be of further assistance, do not hesitate to write me at my residence.

Sincerely,

CPT, MSC

AMERICAN PSYCHOLOGICAL ASSOCIATION
1200 SEVENTEENTH STREET, N.W.
WASHINGTON, D.C. 20036

Telephone: (Area Code 202) — 833-7600

November 18, 1980

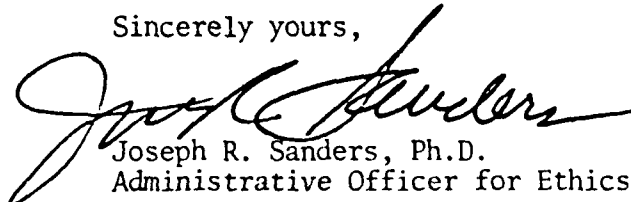
CONFIDENTIAL

Dear Dr.

The Ethics Committee was unable to reach the complaint filed against you at the June meeting. However, it did succeed in getting to it at its October 16-18, 1980 meeting. The Committee then asked me to write you concerning its response to your letter of May 16, 1980 and all preceeding correspondence. The Committee reached the agreement among its members that in their opinion, you should have obtained a signed statement from the complainant in this case. Accordingly, the Committee reprimands you for not requiring such a signed statement. The Committee's authority for such a mild reprimand is contained in Section VII C.4 of the enclosed Rules and Procedures. And consistent with that section, you have thirty days upon the receipt of this letter to respond to CSPEC's recommendation of informal disposition of the complaint against you.

If you accept this mild reprimand, I will close the case and place it in our Closed Case File which only members of the Ethics Staff have access. That will end the matter as far as CSPEC is concerned. If you decide to challenge CSPEC's recommendation, then, consistent with Section VII C.5 of the enclosed Rules and Procedures CSPEC shall have to determine at its next meeting which of the possible options under that section to take concerning the complaint against you. Accordingly, may I have your reply to this letter and recommendation within thirty days of your receiving it.

Sincerely yours,



Joseph R. Sanders, Ph.D.
Administrative Officer for Ethics

jb

Enclosure: (1)



DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
WASHINGTON, D.C. 20310

REPLY TO
ATTENTION OF

DASG-PSC-H

10 AUG 1981

Dear

I consulted with the OTJAG and the OTSG PAD Consultants about the issue in question. Both sources agreed that there was not enough information (formal investigation) for this HQ to make an official response on your behalf at this time. It was recommended that you use the pertinent regulations to directly appeal the APA decision.

The essential information is as follows:

(1) AR 635-40 is the disability regulation. Para 4-1 and 4-2 ^{are} the authority for commanders to refer for medical evaluation (no signature required).

(2) AR 40-66 is the Patient Administration Regulation. Para 2-5 is the authority for disclosure of information from medical records. This regulation supersedes AR 40-42 which was the earlier authority for release of information (no signature required for uniformed members on command referral). The primary authority for these regulations is 5 USC 552a(b)(1), the Privacy Act of 1974. AR 340-21 implements this law for the Army. Paragraph 3-2, especially 3-2a provides the conditions for disclosure of medical information.

Do keep us informed of your progress with APA and we are prepared to support the interpretation of the regulations made by PAD. Good luck.

Sincerely,

276

, PhD

COL, MSC
Psychology Consultant

21 October 1981

President
Division 19
American Psychological Association
1200 Seventeenth Street, N.W.
Washington, D.C. 20036

Dear Sir,

I am writing you to determine Division 19's interpretation and position of Principle 5 of the APA's Ethical Principles of Psychologists.

Recently I was given a "mild reprimand" by APA's Ethics Committee because I failed to obtain a service member's signature allowing me to release a psychological evaluation to his commander.

My patient was fully aware of the limits of confidentiality within our relationship. He eventually was discharged from the service for other-than-psychiatric reasons (incompetence), but he alleged to APA that his discharge was "forced" because I had released detrimental information to his commander without his written consent. The Ethics Committee felt that I had indeed been remiss and mildly reprimanded me for not securing his signature.

As a military psychologist, I am required to respond to a commander's request for a psychological evaluation and to release my clinical records to appropriate individuals, even though the patient does not consent to the release of such. If I do not, I am subject to court martial. If, however, I do respond to commanders' requests, without the patient's consent, I am subject to being reprimanded by my own professional organization.

So, my questions to Division 19 are: (1) Do military psychologists need to obtain each service member's written consent in order to release psychological records, reports, files, etc., to commanders or others who, by AR, are allowed access to such? (2) Are you prepared and willing to expeditiously bring this issue to the Ethics Committee, and to explain the position that Division 19 takes with respect to Principle 5?

Here are some ramifications to consider in light of the precedence set in my case: (1) Virtually every military psychologist seeing patients in the military is currently guilty of unethical behaviors (those who routinely obtain "written consent to release information to commanders, etc." are excepted).

The bottom line is- address this issue. There needs to be specific guidelines for military psychologists. There is simply too much at stake for all other military psychologists to not immediately and directly broach this problem. The risk of further actions by patients against military psychologists is too great, and can only serve to tarnish the reputation of our profession.

I thank you for you time and attention to this matter.

Sincerely,

CPT, MSC

ENCLOSURE 4

LIMITS ON CONFIDENTIALITY OF PSYCHOLOGICAL INFORMATION

It is important that you know the limits of confidentiality and privileged communication regarding psychological information. Military health care records are the property of the United States Government. The same controls apply to these records as other Government documents. Information disclosed by you (patients) to military medical department health care personnel is not confidential. This means that access to information in your file is allowed when required by law, regulation, judicial proceedings, hospital accreditation, or when authorized by you. A written summary of each of your visits with us will be maintained in your medical record and/or a separate Psychology clinical case file.

Military lawyers and chaplains have more complete confidentiality than medical department physicians or psychologists.

Examples where limits on confidentiality may apply follow:

1. If you are on active duty, your commander or higher chain of command will have access to information contained within your health record or any locally maintained clinical record. Your commander can request (make referral for) a psychological evaluation. This means that we will evaluate the status of your psychological health and provide a written and/or verbal report to your commander. Participation in the personnel reliability or nuclear surety programs may require review of the status of your health at any time. The information is normally disclosed on a need-to-know basis. There is no patient-provider basis for privileged communication in the military. Release of such information is required by regulation.
2. Requests for information from sources, i.e., civilian lawyers, spouses, lawyers, etc.) outside the Department of Defense (Department of Transportation for U.S. Coast Guard personnel) will normally not be honored unless you have first given permission (in writing) for the release of the information).
3. If you are involved in any legal action/proceedings your records may be subject to subpoena when ordered by a judge.
4. If you should state that you intend to harm yourself or someone else, or if we believe you intend to harm yourself or someone else, it is our duty to disclose that information.
5. In situations of suspected child abuse, it is our duty to notify medical, legal, or other authorities.

6. If you tell us of a situation that involves violation of military regulations, the Uniformed Code of Military Justice, or civil law, we may be required to divulge that information to the chain of command or other authorities.

7. You may have been referred by another health care provider. If so, a report summarizing the results of your consultation with us will be sent to the referral source.

8. Other members of the hospital/clinic professional staff associated with your health care may, when appropriate, have access to psychological information on record without your written consent.

9. You may be seen in group therapy. If so, you and every other member of the group will be advised that anything discussed which could be considered personal is private information. This includes the names of the group members or any problems that they present. This is not to be talked about with anyone outside the group or clinic. At the same time you must realize that there is no way that the confidentiality of any group member can be guaranteed. Confidentiality will exist to the extent that each patient trusts and respects every other member of the group.

10. All clinical case files are routinely reviewed to ensure quality of care.

11. All psychology intern and other categorically credentialed providers' cases are reviewed after each patient visit to ensure quality of care.

12. Qualified persons with official approval may have access to your record for clinical investigation (research) purposes.

There is no confidentiality or privileged communication in the military. At the same time, we are bound by the code of ethics of psychologists. We will strive to safeguard information obtained from you and insure that only authorized sources have access IAW the above guidelines.

Ask us if you have questions about the limits of confidentiality or privileged communication. You may also inquire at the Patient Administration Division/Patient Affairs Office.

STATEMENT OF UNDERSTANDING

I have read the above and understand that psychological information about me will be safeguarded within the limitations of confidentiality mentioned above and the Privacy Act (DD Form 2005).

Patient Signature

Date

I have reviewed the above limits of confidentiality with the above identified patient to insure that he/she understands them.

Health Care Provider's Signature

Date

ENCLOSURE 5

Ethics Discussion Paper

It is a mistake to assume that confidentiality exists within the military. It does not! It is probably also a mistake to be too emphatic about this issue, to express too loudly that there is no confidentiality, i.e., that anything a patient says can be brought to the attention of command. Where does one draw the line on issues of confidentiality? The APA Ethical Principles of Psychologists states: "Psychologists have a primary obligation to respect the confidentiality of information obtained from persons in the course of their work as psychologists." For example, should confidentiality be breached in any of the below identified situations? What should you do in each of the following situations? What would you do?

1. A self-referred, active duty patient informs you that he uses marijuana on weekends, during holiday periods, and on leave. What if he were a non-active duty patient living on post?

2. A self-referred, non-active duty patient informs you that she is addicted to heroin, has lots of money, a large supply, and is in good health. She is seeing you because of a child management problem. What if she were active duty?

3. A self-referred, active duty patient informs you that he is sexually involved with the spouse of another active duty member. What if he were sexually involved with a subordinate in his unit? What if the subordinate was also male?

4. A self-referred, active duty pilot informs you that he drinks approximately 5 to 6 ounces of alcohol per day but does not consider himself an alcoholic. It is his opinion this has never interfered with his work.

5. A self-referred, non-active duty patient informs you that a physician sexually molested her during a treatment procedure.

6. A self-referred, active duty service member informs you that he falsified a sick slip to avoid getting in trouble with his unit 1st sergeant.

7. A command-referred, active duty sergeant informs you that approximately 15 years ago he was involved in the manslaughter of another member of his unit while stationed in Viet Nam. He has never told anyone about this. The command referral was to evaluate the patient's level of depression and need for treatment.

8. A self-referred, 16 year old family member informs you that she is a regular user of marijuana. What if she were 12 years old?

9. Is the issue of confidentiality any different if the knowledge is obtained during intake vs. the 15th treatment session?

10. You learn from a third party that a psychologist colleague is sexually active with a patient.

11. You observe that a psychologist colleague is exhibiting poor judgment and erratic behavior which appears to result from a serious alcohol problem.

INTERVENTION STRATEGIES
FOR
VICTIMS OF TERRORISM/DISASTERS:
USAREUR SCENARIO

by:

Gregory B. Laskow, Ph.D.
Lieutenant Colonel
Medical Service Corps

March 1987

Conference on Military Applications
of
Clinical Neuropsychology and Health Psychology
Letterman Army Medical Center
Presidio of San Francisco, California

The opinions expressed herein are solely those of the author
and do not necessarily reflect the official opinions of
USAREUR, EUCOM, 7th MEDCOM, or the U.S. Army

Acknowledgements

The author wishes to take this opportunity to express his sincere thanks to the following individuals with whom he has gone to odd and unusual geographic locations of the world in testing, implementing and organizing the Stress Management Team (SMT) of 7th Medical Command, United States Army Europe: Col. Robert Sokol, M.D., Neuropsychiatry Consultant, 7th MEDCOM; Col. Gregory Myer, MSW, Social Work Consultant, 7th MEDCOM; LTC Calvin Neptune, MSW, Staff Social Worker, 7th MEDCOM; LTC Ray Smith, MSW, Staff Social Worker, 130th Station Hospital; Maj. David McDuff, M.D., Psychiatrist, ADACP, 7th MEDCOM. I am especially indebted to Maj. McDuff whose uncanny foresight and creativity along with organizational genius were instrumental in the overall success of the SMT concept.

It does appear that international terrorism is here to stay and there are those that feel that the format of terrorist events of the future will be far different than those that we have known from the past two decades. In a recent presentation at a gathering of military and civilian mental health professionals in West Germany, shortly after the Achille Lauro Hijacking, Robert Blum, M.D. suggested that the incidents occurring from organized terrorism identified with a strategic plan of action and allied with an identified ideological cause are becoming the exception rather than the rule (1986). As he indicated, "...the value of the hostage to the terrorist as a bargaining instrument can no longer be counted on to reduce the danger to the victim, particularly in the case of Americans" (1986). Accordingly, the likelihood of physical casualties occurring during an event is on the rise and the victim may not be so safe and may not be able to rely on the development of the now famous Stockholm Syndrome. Furthermore, there is mounting evidence that the training of the terrorists itself emphasizes preventative tactics to minimize the occurrence of such a syndrome.

Again, Blum notes that the danger therefore to Americans is increasing and the probability of mass casualties is increasing equally. This was clearly evident in the most unsophisticated and carelessly planned terrorist event that resulted in the deaths of 20 individuals aboard Pan Am 73 in Karachi, Pakistan, September, 1986. At this point suffice to say that the terrorists involved were ill prepared for contingencies and events as they occurred and in fact their composite abilities to formulate alternative plans for contingencies were probably severely compromised due to convincing evidence that they had smoked a large amount of marijuana shortly before taking the aircraft.

Initially, international terrorist incidents were considered radical, impulse driven and formulated by individuals who were barbaric and lacking in any ability to make sound intelligent decisions. It was further speculated that such primitive groups certainly ought to be able to be overcome by the massive technological sophistication and with the vast arsenal of the western free world. Obviously, the 444 days in Tehran, Iran clearly demonstrated the awesome power of a few versus the masses. Furthermore, the galactic differences held by the divergent ideologies regarding the value of a single human life were certainly operative as well.

Eventually, terrorism was considered not merely an act of pure id- driven radicals or extremists and that their actions were not "mindless". In fact, this very feature of terrorism is embodied in the U.S. Army's definition of terrorism with the emphasis on the notion that "it is a well thought out attack specifically designed to attract the attention of the mass media, which then spread a confusing message often interpreted as mindless" (U.S. Army Regulation 190-52).

Yet a key difference today seems to be another reversal noting the absence of the calculated or strategically planned aspect of an incident and therefore the outcome today may in fact actually be determined more as a matter of impulse rather than design by the terrorists.

Given these factors, the Armed Services need to be prepared to respond with a model of intervention and response allowing for a rapid constitution and deployment of medical teams responsible for a given area of intervention and a well defined method for mobility of response or method of getting to the aftermath of an international terrorist event. The reason.....there are several.... and not the least of them is the fact that the vast majority of the incidents take place in regions of the world that are in some proximity to existing medical/logistical assets of the Armed Services. Many similar geopolitical factors were clearly the precipitant for the formulation and formalization of response teams such as the USN's team known as SPRINT (Special Psychiatric Rapid Intervention Team) ; such a team has been in existence since 1977. The U.S. Army however, responded somewhat differently to the various crises in USAREUR . Some of the crises have generated casualties from international terrorist incidents and it was initially felt that existing fixed medical facilities were sufficient to provide the appropriate medical intervention and disposition. However, the bombing of the Marine barracks in Beirut tremendously challenged this thinking and almost immediately initiatives were examined to alter the strategies for immediate crises health care delivery under these circumstances in addition to those generated as a result of manmade and natural disasters within the theater. Thus, we have some of the elements of the genesis for the USAREUR-EUCOM plan for its response to disasters and relief missions in the European Theater of which the EUCOM Stress Management Team (SMT) is a component.

The SMT is one of several deployable teams that are organized, staffed and logistically supported as set forth in the guidelines of 7th MEDCOM OPORD 1-86 (Disaster Relief/Contingency Operations, 30 May 1986) and each of these can be tailored to the type of mission. Some of these include the Triage Team, deployable in three hours; the Emergency Treatment/ Stabilization Team, deployable in eight hours; the Surgical Team, deployable in eight hours; the contingency Hospital, deployable within 24 hours. Others include the Medical Disaster Area Survey Team and the National Medical Liaison Team. All personnel designated for participation in any facet of this OPORD are to be prepared for immediate deployment and therefore appropriate uniforms, TA-50, immunization records, official passports, etc must be prepacked and current.

As with the USN's SPRINT, the Air Force has numerous FASTs (Flying Ambulance Surgical Teams) located in Spain, Turkey,

Germany, England which are deployable within two hours using both C-130's and 141's. (It was just such a joint mission between the USAFE FAST and USAREUR SMT that retrieved the victims from the September 1986 Pan Am 73 incident).

The SMT's mission statement is as follows:

"The SMT will provide mental health treatment services and initiate preventative treatment measures to individuals or groups involved as victims of disasters, terrorists activities and/or hostage situations. The team will be able to provide the following services: crises intervention, group education/counselling, stress management, family counselling, triage and psychotropic drug administration. One or more teams will be able to care for one to four hundred people. (ANNEX L, PARA. 2, to 7th MEDCOM OPORD 1-86).

The composition of the core SMT is as follows:

	Quantity	MOS/SSI	DTY PSN	UNIT
TeamLdr	1	60W	StaffPsy	7th MEDCOM
Psychiatrist (Assn't Team Leader)	2	60W/60U	ADAPCP/ Staff Psychiatrist	" 130th StaHos
Psychologist	1	68S	Staff Psychologist	130th StaHos
Social Worker	3	68R	SW Consul/	7th MEDCOM & 130th StaHos
Chaplain	2	56A	Staff Chaplain	7th M
	1	"	Hosp Chap	97th GenHos

Furthermore, this core team had additional augmentees from the other fixed medical facilities in the USAREUR Area of Responsibility. On numerous occasions, these augmentees would become involved in relief of the core team after a specified period had elapsed on a mission. This became a vital component to be able to sustain the medical/mental health care intervention.

Augmentees were also critical in their participation of all the activities of the Command Post of the Emergency Operation Center.

There are a variety of intervention strata in which the SMT can potentially become involved. These are:

- (1). Negotiation
- (2). Retrieval
- (3). Hospitalization
- (4). De-Briefing
- (5). Re-Entry

As of this writing, most of the applications of the SMT to date have concentrated on the latter four. In each, there is required a specific focus for the victim and application is made of the appropriate element of the acronym developed by the Armed Services known as BICEPS, namely Brevity, Immediacy, Centrality, Expectancy and Proximity. Furthermore, the SOP of the SMT identifies four primary functions:

(1). Triage: identifying those that are in need of immediate medical and mental health care. Often, the individuals when asked as an assembled group will identify themselves. Also, the attending medical personnel and flight crew are invaluable extensions of the SMT and can facilitate the identification process.

(2). Management of Acute Emotional Problems: the full range of possible reactions can be expected to occur. Reactions such as anxiety, lethargy, fear, agitation, exhaustion/fatigue, numbing, automatic behavior, excessive compliance with authority figures, crying, etc. Often, the relationships that developed during the incident continue and may be an additional source of support during the initial period following the termination of the crisis.

(3). Consultation: perhaps one of the most powerful interventions performed by members of the SMT. The targets of this are the flight crew including the pilots, the attending medical personnel, other SMT members, other interested personnel such as the FBI and members of the State Department. On a number of occasions, members of the SMT have had the opportunity to provide on the spot "inservice training" to the crew of an Air Force aeromedical evacuation team or the flight attendants of a commercial airline who were participating in the return of the victims to the homeland. In one instance, the vice president of

the airline company who was aboard the aircraft solicited consultation as to strategies for assisting the pilots of the sieged aircraft.

(4). Prevention: This particular function is considered by most on the team to be one of the most crucial. It is the one felt to have the greatest possible impact for the future of an individual who has experienced an terrorist incident or some form of a disaster. Immediately upon retrieval or rescue, reassurances are initiated noting that there are expected and natural/normal reactions that are totally within the range of human experiences. This can be done with individuals but perhaps is most effective with the established, intact groups. With the groups there seems to be a further dispelling of the notion that one's behavior during captivity or the disaster was "abnormal". It is extremely important that the family members who may be available are briefed as to the expected range of reactions over the ensuing months (and possibly years).

(5). Team Maintenance/ Health: applying many of the same principles to the Team itself. This is perhaps one of the most frequently overlooked functions of the SMT yet certainly should be implemented throughout various times of the mission in order to insure that there are no casualties developing among the team members themselves. Sleep discipline is one requirement.....the flights for the retrieval/rescue component of the mission could involve crossing and returning over several time zones. Periodic regrouping of the team to discuss shared observations, data, strategies, and reactions, permits a release of the very powerful emotional buildup that gets placed on the back burner while one is working at a fast and furious pace. Once the mission has been completed, the core members of the team gather as a group and share their experiences with other members of the SMT who may not have been directly involved in the mission and who at that time become somewhat like group facilitators for those that were. Team members are encouraged to maintain frequent contact with each other throughout the ensuing weeks as they return to their 'normal' duties and when they may discover some psychological 'decompression' difficulties.

During the past several years the SMT has been organized, of all the existing teams under the guidance of the OPORD 1-86, it seems to have been tasked the most often. What follows is a sample of the operations to date. What should be remembered is that on various occasions the team would be alerted and staged in various parts of the theater only for the mission not to occur. Also, each mission has its unique circumstances and as will be seen later, not all of them are managed in exactly the same fashion.

MISSION	DATES
TWA-Athens, Algiers, Beruit, Algiers, Beruit	29 June- 2 July 1985
Achille Lauro (see Appendix A)	10-12 Oct.85
Beruit Hostages (pre deployment)	22-27 Nov.85
Malta Hijacking (alert)	23-26 Nov.85
101st Airborne	17-18 Dec.85
Beruit Hostages (alert)	17-19 Jan.86
Radiation Tour Group-Chernobyl	1-4 May 86
Beruit Hostages (Fr. Jenco)	26-29 Jul.86
PanAm 73- Karachi	5-8 Sept 86

McDuff (1986) has written extensively about the application of the SMT throughout the USAREUR theater and provided a useful phase concept to the operations:

(I). Anticipation of Release: This is obviously appropriate primarily for a hostage/victim scenario. A member or members of the SMT are placed in the vicinity of the victim and as close as is diplomatically possible (principle of proximity) in order to rapidly begin the work for eventual return to home (principle of immediacy). Length of this phase can be from mere hours to days. Quite often, the victim under these circumstances may develop a similar reaction and return of symptoms than were evident in the initial period of capture but then slowly dissipated.

(II). Release Phase. Victim(s) are exposed to large numbers of individuals including members of the health care teams. Some of the victims may form intense close bonds with a particular

member of the team at this point. This relationship ought to remain until the retrieval phase takes place and perhaps continue beyond then as well. Simple instructions to the victims are imperative as well as keeping them informed as to each facet of the release and upcoming phases. Typically, this phase lasts about 24 hours.

(III). Retrieval Phase. At this point, the victim becomes aware that the end of their ordeal is in fact a reality and perhaps here is when the guard is let down a bit. The exhaustion, sensory overload, reactivation of the initial experience, brief cognitive confusion, bursting into tears, disturbing thoughts are all likely to occur. During the retrieval phase, simplicity again is paramount and there needs to be extra effort to control excessive demands of the victims that could lead to further overstimulation.....i.e. the media. All developments are briefed to the victims so that they can be kept up to date and to begin to emphasize that they are in control. What has also been observed during this phase is almost a blind compliance with the authority figures involved and so one has to be cautious not to overdo it and to give every opportunity to the victim to participate in the decisions being made. This phase normally lasts from 24 to 48 hours.

(IV). Hospitalization and Debriefing Phase: There are mixed feelings as to the necessity of the particular phase for all victims because it is felt that the role of "illness" may be inadvertently conveyed which may be a compromise of the principle of expectancy. However, it does comply with the principle of centrality having the former hostages in one location and it does acknowledge that the process of decompression for them ought to capitalize on the existence of the small groups formed during their ordeal. It is the author's personnel contention that this can be accomplished away from traditional medical facilities while still gathering them in one location. However, the model in USAREUR traditionally places the former hostages at Wiesbaden AF Hospital and most recently at other medical facilities throughout the Army network. Whatever the location, the recommended length of stay is three days (principle of brevity). It is also during this phase that the debriefing process is initiated with members of the FBI and the State Department. These debriefings have been considered as extremely therapeutic by the former hostages and the term itself conveys again a non-illness perception of the normal reaction to this trauma.

More than likely, the first physical contact with the former hostage's family occurs at this juncture and it has been observed that the arrival of the family on the second day is optimal; this allows the victim to acclimate to his/her surroundings. Once the family arrives, any opportunity to spend time with them is invaluable and the total plan as to the upcoming events for their preparation home can be explained. Furthermore, the

expected and likely reactions of such ordeals may be illustrated to the family at this time. A model that has proven useful for the illustration of these reaction is included in Appendix B. So too, the barrage of stimulation and excitement over the past several days can upon returning home lead to an emotional letdown as they prepare to go on with life "as usual". Ways of coping with this and any other future difficulties can be discussed.

(V). Re-Entry Phase: As the victim leaves the hospital or other structured environment, there is likely to be a lessening of the acute emotional reaction, a renewal process of their captivity or disaster, a sense of comfort and a confidence that they will be able to cope with the demands of the upcoming months (principle of expectancy). Here it may be advisable that the notion that what they dreamed being home would be like while they were in captivity may be somewhat different, but that they will survive the differences. The bulk of work to be done by the former hostage or disaster victim in this phase is usually 4 to 6 weeks although obviously each individual will process these re-entry events in a fashion according to their own schedule.

A preventative intervention model is illustrated by McDuff in Appendix B. Although this model had evolved primarily in the SMT's work with hostage scenarios, the principles are easily transferred to disaster situations as well.

By way of illustration of the variety of possible intervention scenarios by the SMT, Appendix D contains xeroxed copies of media coverage of the PanAm 73 event and which provide a sample of the application of the principles addressed in this paper as well as a first hand accounting of the range of reactions in a traumatizing event such as this.

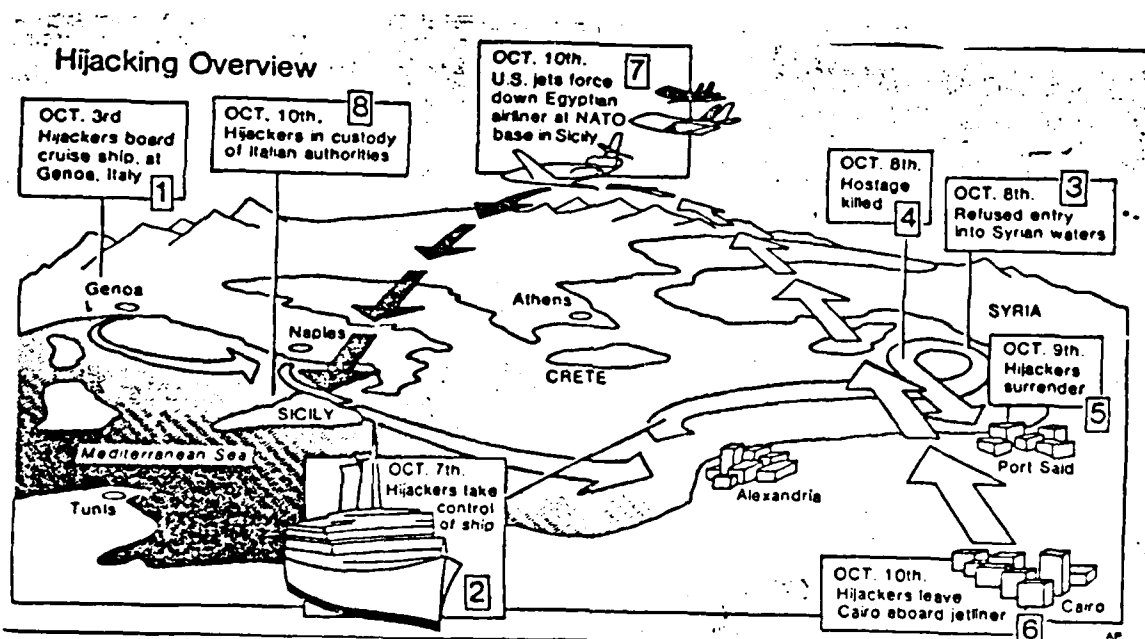
CONCLUSIONS

The Stress Management Team as a component of the 7th MEDCOM Disaster/Relief Plan and concept appears to have proven itself as an effective intervention strategy for victims of both disaster and terrorist incidents. Using the principles long advocated in combat health care, the SMT, as an integral portion of a complex response plan, is a viable format for early intervention and prevention of possible debilitating post traumatic stress disorders.

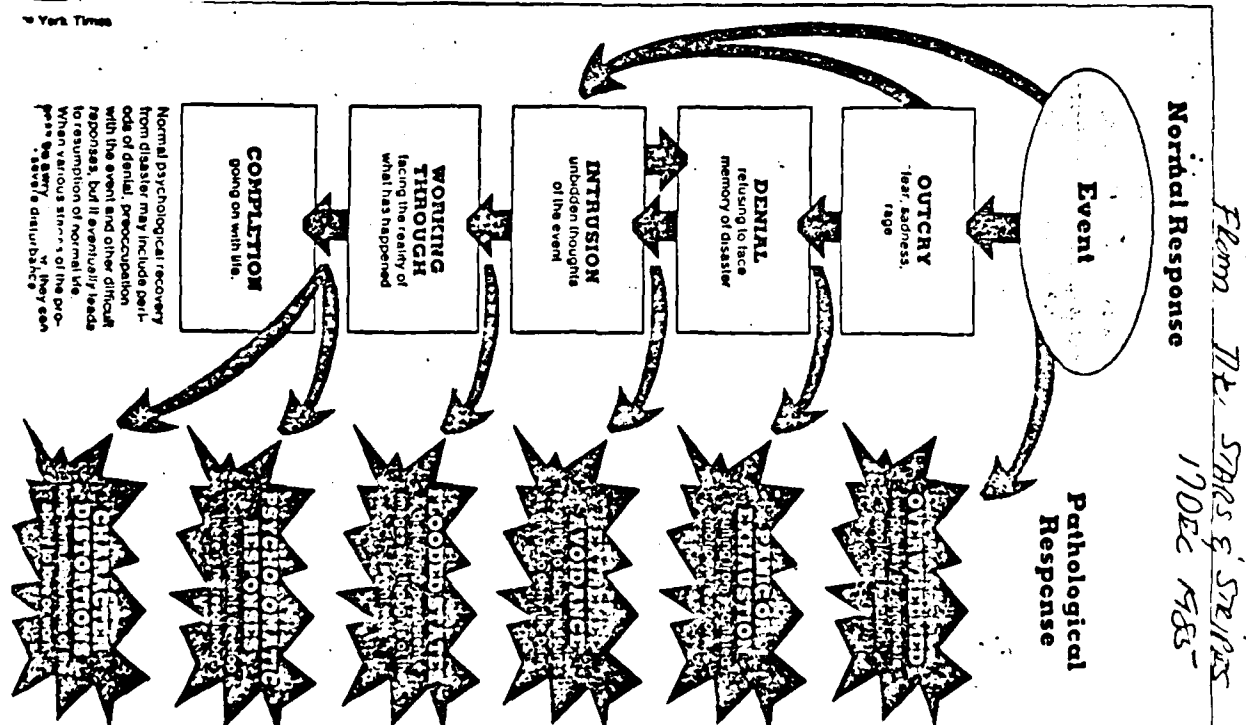
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- McDuff, D.R. (August, 1986). The prevention of post traumatic stress disorder in victims of hostage situations. Paper presented to the annual meeting of ADACP Counselors, Mannheim, Germany.
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- 7th Medical Command, United States Army Europe (30 May 1986). OPORD-1-86 : Disaster relief/contingency operations.
- 7th Medical Command, United States Army Europe (Sep 1986). Standing operating procedures : Stress Management Team.
- U.S. Army Regulation 190-52.

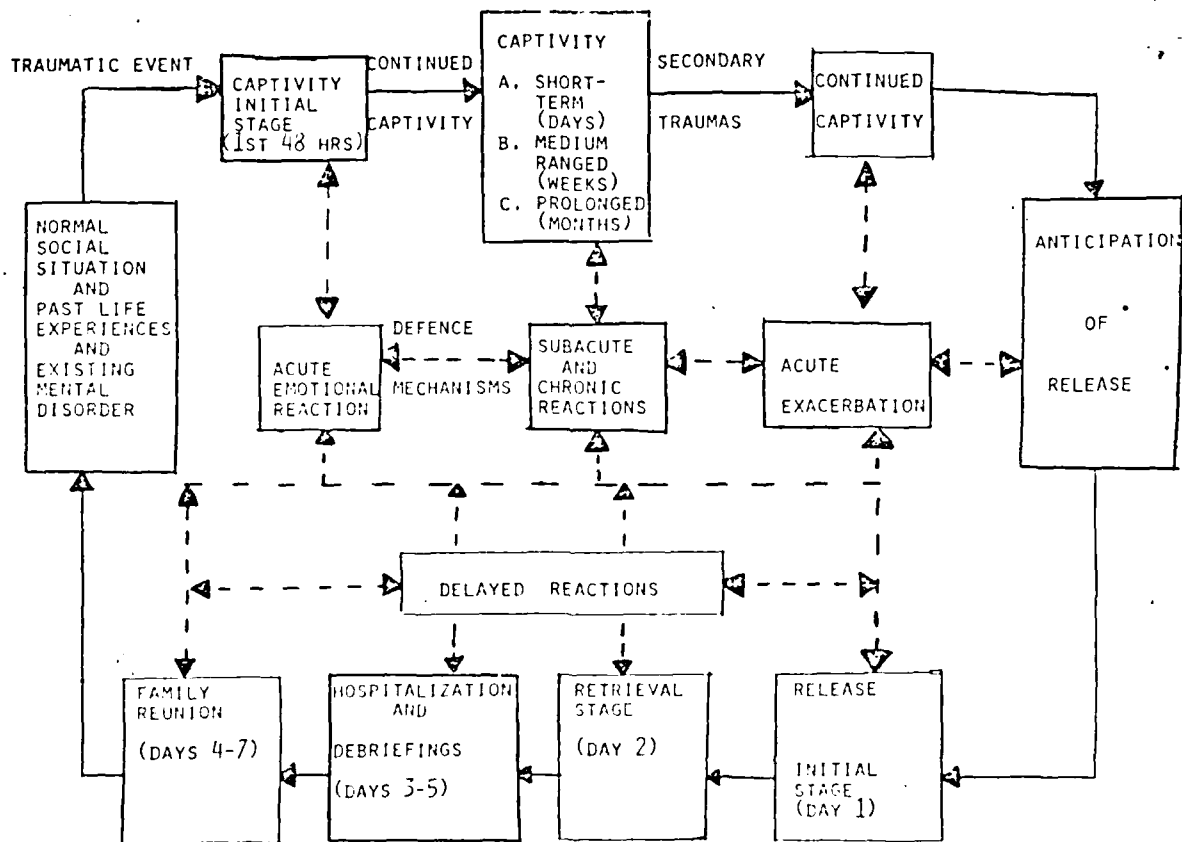
APPENDIX A
HIJACKING OVERVIEW:
ACHILLE LAURO



APPENDIX B
NORMAL RESPONSE PATTERNS:
DISASTERS

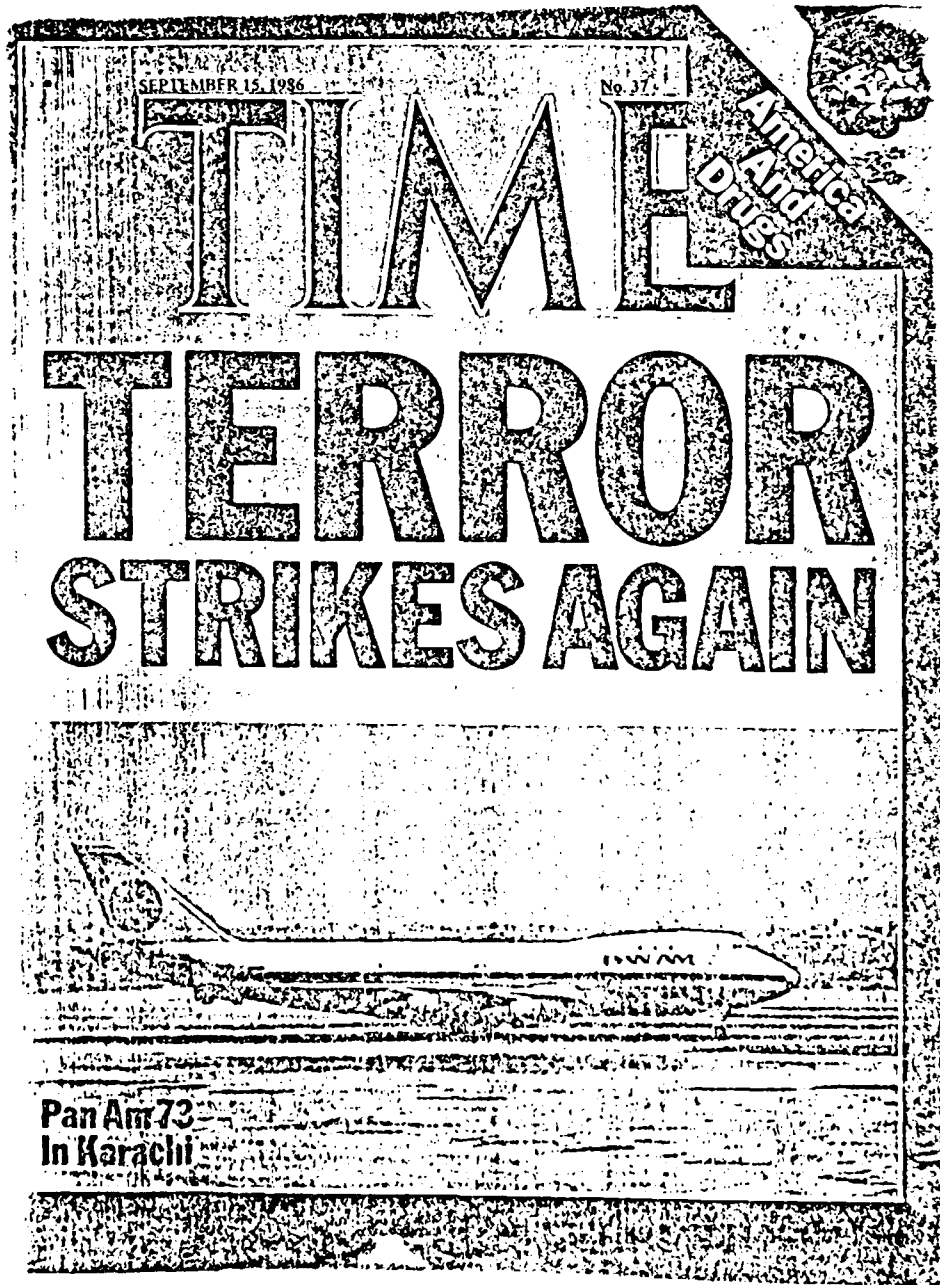


APPENDIX C
PREVENTATIVE INTERVENTION MODEL
FOR
HOSTAGE/CAPTIVITY VICTIMS

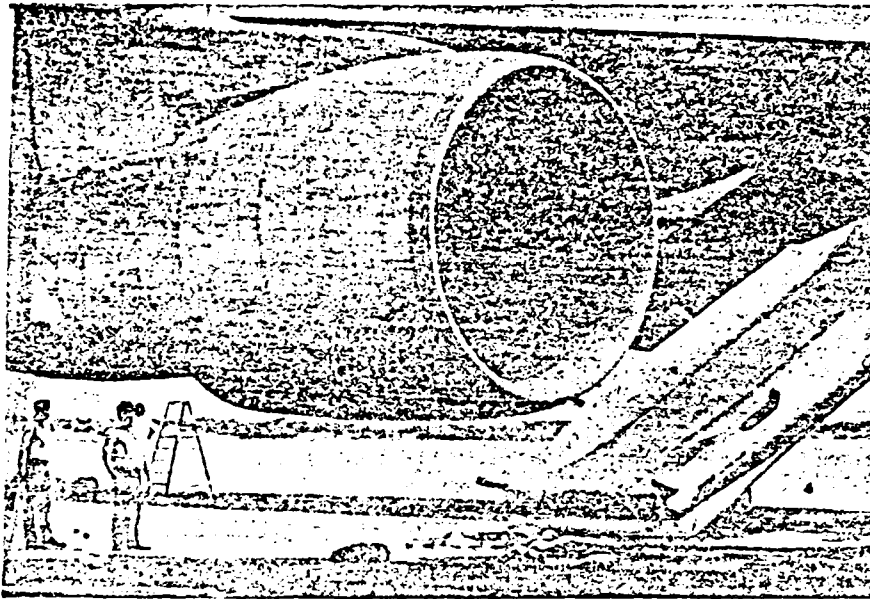


(MacDuff 1981)

APPENDIX D
MEDIA ILLUSTRATIONS
OF
SMT INTERVENTIONS



Death toll set at 15 in jetliner hijacking



Police stand guard near a Pan Am jetliner after the end of the plane hijacking carried out by four men in Karachi, Pakistan.

KARACHI, Pakistan (UPI) — Security forces were caught off guard when four hijackers opened fire on some 350 hostages aboard a Pan Am jumbo jet at the end of a 15-hour drama that left at least 15 people dead. Pakistan's aviation chief said Saturday. (Related story, Page 28.)

There was no commando raid on the plane, as Pakistani officials reported earlier, and at least 10 minutes elapsed after the shooting started aboard the Boeing 747 before security forces tried to reach the plane, said Kurshid Anwar Mirza, director of the Civil Aviation Authority.

"We had told our people (security forces) to stay in readiness," Mirza told an airport news conference Saturday. "They were not in that near vicinity. This happened earlier than what we had anticipated. There was no organized force coming forward."

Mirza said confusion broke out when the plane ran out of fuel and the power was cut off.

As he prepared to have forces storm the plane, he said. "Where are our people? Where are the commandos? They must come out."

Pakistani officials said at least 15 people were killed, among them three Americans. Hospitals reported 127 people injured. White House officials said 17 of the injured were Americans.

Pakistani officials, meanwhile, issued conflicting statements about the fate of the four hijackers, all believed to be Palestinians.

Some said all four survived. Others said one was killed, one was wounded. See HIJACKING on Page 28

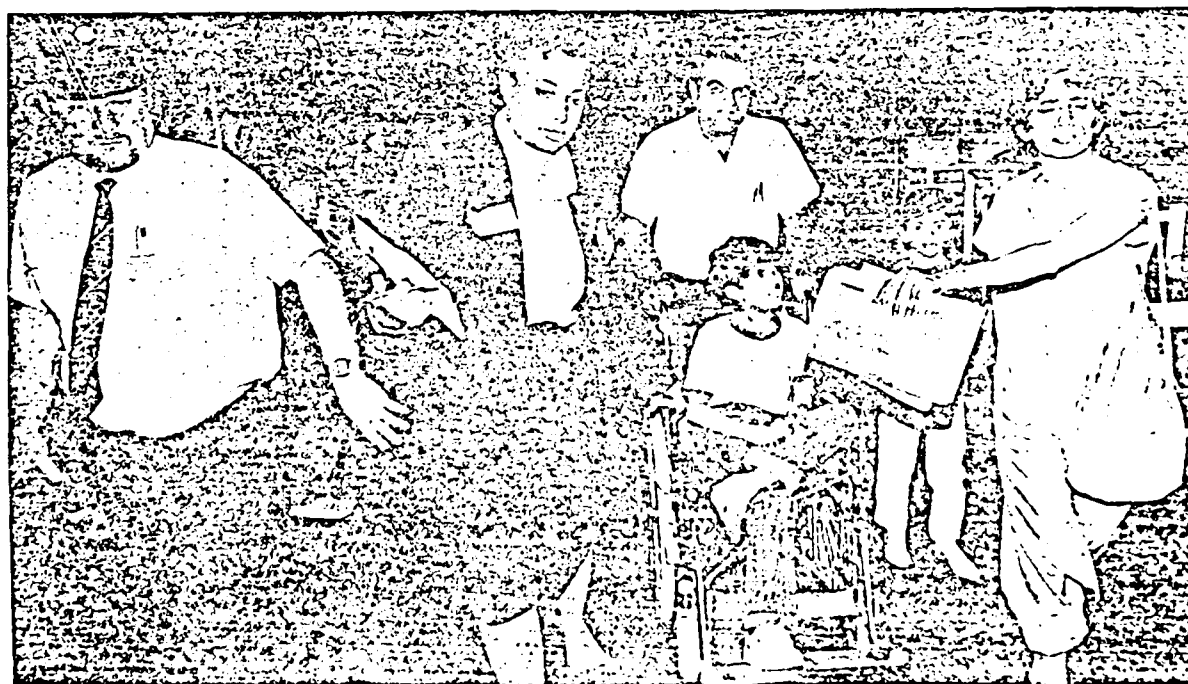
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STARS & STRIPES

TIME MAGAZINE: 15 Sep 1986





TIME MAGAZINE: 15 Sep 86



Hijack victims on their way home

S&S photos by Ken George

Hijack survivor tells terrorist cowardice

GO TO HELL!



*Lucky ones
relive the
nightmare
— at JFK
homecoming*

PAGES FOUR AND FIVE

Abu Nidal brain

inside strip	
<input type="checkbox"/> Rehnquist memo sparks controversy	Page 5
<input type="checkbox"/> Officials explore kidney program at Landstuhl	Page 9
<input type="checkbox"/> College football's first big Saturday	Sports

The STARS and STRIPES

AUTHORIZED UNOFFICIAL PUBLICATION FOR THE U.S. ARMED FORCES

Vol. 45, No. 143 - Monday, September 8, 1986

★ ★ The Daily and Sunday

D 8693 A

Hijack victims land in Germany

By J.L. KOMINICKI
Staff writer

RHEIN-MAIN AB, Germany — Eleven people seriously injured Friday in the hijacking of a Pan Am jumbo jet in Pakistan arrived here early Sunday aboard an Air Force transport plane.

Six Americans were aboard the C-141 Starlifter that also carried six uninjured family members who had been passengers aboard the airliner when it was hijacked in Karachi, Pakistan. (Related stories, photos on Pages 2, 3 and 7.)

More than 200 other passengers who were aboard the hijacked plane arrived in Frankfurt Sunday at 7:10 p.m. on a special Pan Am flight from Karachi.

An Indian Airlines Airbus left Karachi for Bombay shortly after the special Pan Am flight took off, the Associated Press reported. It carried 89 hijack survivors, including 13 wounded, Indian diplomats at the Karachi airport said.

Conflicting news reports put the death toll at 15 or more, including at least one American. Reports said more than 120 were injured.

Pakistani officials said at least 15 people were killed, among them three Amer-



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Dr. (Col.) Ken Maffei assists Nadya A. Hussain at press conference.

Injured teen criticizes Pan Am crew's escape

By J.L. KOMINICKI
Staff writer

WIESBADEN, Germany — A 16-year-old girl, wounded when Palestinians commandeered a jetliner in Pakistan last week, said the gunfire that killed 19 and wounded 150 others could have been prevented had the plane's captain been on board to reassure the hijackers.

Nadya A. Hussain, who suffered gunshot wounds in the face and arm, said the massacre aboard Pan American World Airlines Flight 73 began because the hijackers believed Pakistani commandos were attacking the plane.

"When the lights began to dim, (the hijackers) panicked. They didn't know what had happened, and they asked for a radio. That's when I realized that the captain wasn't on board. If he was on board, he could have calmed down the people and they wouldn't have started shooting and they wouldn't have shot me," she said, breaking into tears.

"If the captain was on board, he could have told them, 'Let the women and children go, and I will fly you wherever you want to go.'"

Pan Am officials have defended the three-member crew's escape as the

See CRITICIZES on Page 28

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CRITICIZES

From Page 1

best way to thwart the hijackers' demands that the plane be flown to Cyprus.

Hussain, a native of suburban New York City, is the first of the wounded passengers to speak publicly. She appeared at a brief news conference Tuesday afternoon accompanied by her mother and Dr. (Col.) Ken Maffei, commander of the Air Force Regional Medical Center in Wiesbaden.

Officials at the facility list Hussain's condition as stable. Her speech was slurred as a result of her facial wounds, but she spoke deliberately. She appeared at the news conference in a hospital gown and robe and was wearing blue socks and white tennis shoes. Her left arm was in a sling.

Hussain said the hijackers came aboard the plane shooting and then began shouting for passengers to raise their hands.

"We did that, and we had to keep them in the air for

10, 12 hours," she said. "Finally I got fed up and put them down. I didn't care what they said anymore."

The hijackers hit passengers and members of the crew, she said, and they "hit a stewardess most of all. If she didn't do what they asked, they did violent things to her."

Asked if she was bitter toward the hijackers, Hussain said she is "bitter with everyone."

Of the hijackers, Hussain said she would ask them: "Why did you do it? What is the reasoning?"

Hussain said one hijacker continually paced the aisle during the ordeal, and she briefly considered tripping him.

"I thought about putting my foot out, because I was in an aisle seat and tripping him and getting his gun. But my grandmother told me not to, that there were four other hijackers who would shoot me."

She said her grandmother is being treated in a Karachi, Pakistan, hospital for shrapnel wounds in the feet. The two managed to flee the plane when an emergency exit equipped with a slide was opened.

"I couldn't walk because my arm had a bullet in it.

It was so heavy," she said. But I thought it was my arm or my life. I got to the door, and several people helped me, carried me down the slide, and I was taken to the hospital."

Hussain and 10 others wounded in the hijacking were transferred to Germany Sunday aboard a U.S. Air Force C-141 Starlifter transport plane.

Also at the Wiesbaden facility, Malikarjun Netakanti, a native of Silver Spring, Md., was in stable condition Tuesday with a jaw fracture. Two male passengers also are being treated at the facility for neck wounds and cuts. Both are in stable condition, officials said.

Two others are being treated at the Army Regia Medical Center in Landstuhl, Germany. A male suffered gunshot wounds in the head was listed as seriously ill, but making progress.

A woman suffering from heel injuries was in good condition.

There was no information on the conditions of a Briton, an Italian and an Indian at the Army Regia Medical Center at Frankfurt and of a girl and boy receiving treatment at the University Clinic in Frankfurt.

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sengers, a flight attendant and a ground crew employee, UPI reported.

At Rhein-Main, Air Force and German medical technicians immediately began removing the wounded. First off the Starliner was an Austrian who was transferred to a waiting commuter jet. Two Americans were put aboard an Army helicopter for the 30-minute flight to the Army Regional Medical Center in Landstuhl, which specializes in the treatment of burns and head injuries.

A victim of the Pan Am hijacking in Karachi, Pakistan, is wheeled to a German ambulance at Rhein-Main AB.

The other wounded were placed in waiting ambulances, a State Department spokesman said. He said the group included a German, an Indian who lives in Germany, a Briton and an Italian. The family members on the flight, including four children, were put aboard a medical transport bus.

An entire British family was on board

the U.S. Air Force plane, AP reported. Hardial Singh Matharu, 35, who suffered shrapnel wounds in the hijacking, his wife, their three children and a niece were all on the C-141. Derek Page, the British vice consul in Frankfurt, told the Associated Press.

Matharu was hospitalized in the U.S. Army's Regional Medical Center in

Frankfurt with shrapnel wounds in his back and heel, Page told the AP.

Matharu's wife had also been slightly wounded in the ankle but did not require hospitalization, Page said. The children were not hurt.

The family was allowed to travel with Matharu on the C-141 and to stay with See VICTIMS on Page 28

Survivors tell of ordeal in jet, escape



Hijack victim Dick Melhart talks to reporters at Frankfurt International Airport.

By DARYL GREEN,
MIKE HERONEMILS
and DAVE WALCZAK
Staff writers

FRANKFURT — Dick Melhart told of opening a door and escaping the tragedy that befell at least 15 of his fellow passengers aboard Pan American World Airways Flight 73 in Karachi, Pakistan.

"I was standing near a door and I opened it. It was easy. All the time, there was no panic," he said.

Four gunmen took over the jumbo jet Friday as it stopped in Karachi en route to Frankfurt. After 10 hours on the ground, the plane's lights went out and the gunmen opened fire, killing the passengers.

Melhart was one of 209 survivors who boarded a special Sunday flight from the Pakistani port city to Frankfurt.

Most of those arriving on Pan Am flight 6073 declined to talk to reporters who jammed a Frankfurt International Airport departure gate.

Melhart, 44, said the "lights went out and, 15 minutes later, they opened fire. When he (a gunman) fired at me, I was glad he missed. They opened fire on women, children, everyone."

Asked his reaction to the Pakistani handling of the incident, Melhart said: "There was no Pakistani action."

"I was one of the first ones out. I ran

away (toward the terminal) as fast as I could. Then there was a bunch of people screaming, 'Lie down, lie down, lie down.'"

Melhart, of Pullman, Wash., was continuing the flight to JFK International Airport. "I'm getting out of New York as fast as I can," he said. Once home, "the first thing I'm going to do is hug my family."

He said a flight attendant hid him and other Americans passengers "where nobody did a lot of shooting and I was I know who she is, but I'm not going to tell you."

Thomas Kacuber, a German architect who, along with his wife, Carman, spoke to reporters, said "the atmosphere at the rear of the airplane was pretty relaxed. The kids were playing cards. We didn't even know anyone had been killed," referring to the death of Rajesh Kumar, who was thrown off the plane before the nearly 17-hour wait on the airport's tarmac.

"One thing I'm mad about is the hijackers said they didn't like Americans, but they tried to use pressure on Americans to get to Cyprus," Clarence Maloney told the Associated Press. Maloney is a 32-year-old anthropologist who lives near Munich.

"No Pakistani commandos ever came See SURVIVORS on Page 28

SURVIVORS

From Page 1

on the plane until it was all over," Maloney said in recounting the bloodbath that ended the hijacking.

"I spent 15 hours sitting in the aisle," Maloney added, saying that he and other passengers were asked to keep their hands behind their heads for hours.

Eight-year-old Kamran Majid of New Jersey said, "My dad was laying over me

when the shooting started." His first goal is "to hug my mom" upon returning to the United States.

His father, Abdul, said "there was not a great deal of panic, but everyone was scared what would happen when the lights went out."

He said the "fear of outside intervention" prompted the gunmen to open fire.

FBI agents investigating the hijacking were at the airport to meet the plane and talk to the 44 Americans aboard "if they have evidence to present," State Department spokesman Michael Austin said.

portedly told AP.

"We want to learn as much as possible to prosecute if we can get our hands on these folks," said Austin, referring to the FBI involvement. He said Federal Bureau of Investigation agents also wanted to talk to passengers to learn how to prevent similar hijackings.

A Pan Am spokesman said 122 of the passengers were continuing to JFK airport in New York. Another 18 were to take a connecting flight to London, and two had connecting flights to Stockholm, Sweden. The other 67 listed Frankfurt as

their final destination, but the spokesman said some would probably take other connecting flights.

The passengers were greeted by more than 12 uniformed German police and a least a dozen airport security personnel in addition to airline personnel.

The airline also provided refreshments for the Flight 6073 passengers in the waiting area, where most of them took refuge from reporters and photographers.

The flight from Karachi aboard the Boeing 747 jet took about 10 hours. The jet was dispatched from Frankfurt to pick up the passengers.

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Slain flight attendant is hailed as 'heroine'

NEW DELHI, India (AP) — Neerja Mishra, the Pan American flight attendant killed in the Karachi, Pakistan hijacking, was hailed Sunday as a "heroine" for her apparent role in warning the cockpit crew of the takeover.

The former model would have celebrated her 23rd birthday Sunday.

The Sunday Mail of New Delhi called the Bombay native the "heroine of the hijack" and said she had warned the cockpit when the gunmen came aboard.

The warning allowed the pilot and his crew to escape from the cockpit, leaving the jet immobilized on the Karachi tarmac and stalling the hijackers' efforts to get the jet flown to Cyprus.

Mishra "paid with her life because of her bravery in warning the cockpit crew about the entry of the hijackers," the Sunday Mail said.

The Indian Express said some of the negotiations between the hijackers and the passengers had been conducted through Mishra, who was the senior

pursuer on the flight.

The Times of India headlined its account: "She Died a Brave Death."

Officials in Karachi had said the pilot and his crew evacuated the cockpit after a tipoff from the cabin crew, but they did not say who had given the warning.

According to the newspaper accounts, Mishra was married late last year.

The Sunday Mail said that, before joining Pan Am, Mishra had enjoyed a successful modeling career.

Her appearances in advertisements for Charmis cold cream had earned her the nickname "the Charmis girl" and offers of roles in Hindi-language films. Instead, the paper said, she chose to finish studies for her bachelor's degree at a college in Bombay last year and then take to the skies.

The newspapers said Mishra had undergone a Pan Am training program in the United States that included anti-terrorist instruction.



TIME MAGAZINE -
15 Sep 86

AF jet flies 11 injured in hijacking to Germany

By JUDY SARASOHN
Medical writer

WIESBADEN — Eleven wounded passengers from the Pan Am jet hijacked in Pakistan were on a U.S. Air Force C-141 aircraft Sunday morning on their way to hospitals in Germany.

State Department spokesman Michael Austin said the plane was expected to land at Rhein-Main AB by 8 a.m.

The wounded being transferred are four Americans, three Britons, two Germans, one Austrian and an Italian. They were accompanied by six family members who were not injured in the bloody hijacking at Karachi, Pakistan.

Three of the Americans are expected to be hospitalized at the Air Force Regional Medical Center in Wiesbaden, Austin said Saturday night in a news briefing at Lindsey AS. The other American is expected to be transferred to the Landstuhl Army Regional Medical Center, he said.

The other seven injured are to be treated in German hospitals.

The four Americans were in "serious condition," but how serious I don't know," he said.

They were among the 127 wounded and at least 16 killed in a 15-hour hijacking by four armed men. The ordeal ended when the generator running the plane's lights ran out of fuel Friday night, plunging the interior of the Boeing 747 into darkness, the Associated Press reported. The hijackers opened fire with machine guns and tossed grenades at the approximately 400 hostages.

Austrian did not know the specific injuries of the four Americans, who were all on stretchers. However, he said the American going to Landstuhl had head wounds. Landstuhl is the military center for neurosurgery and burn treatment in Europe.

The more than 100 other injured passengers remained in Karachi because

their condition was too serious for them to be evacuated or they chose to remain in Pakistan, Austin said. They were being treated in four Karachi hospitals, he said.

Five Air Force doctors and five Army doctors flew with the C-141 to Karachi Saturday morning. Military psychologists and psychiatrists also were on board to help passengers deal with the trauma of the hijacking. The medical team went to evaluate which patients needed to be evacuated and which passengers could wait for a regular commercial flight, he said.

Austrian said U.S. officials had not yet decided whether a second Air Force jet would be sent to transport other wounded passengers.

Communication with the Karachi airport was difficult, and details of the nationalities of the injured passengers were still sketchy, Austin said.

"We still don't have a very good fix on

the number of Americans," he said.

Officials believe 83 Americans were either on board or in the process of checking in when the hijackers boarded the plane, Austin said. As many as 41 of the 83 Americans were not on the plane, he said. The driver of one busload of passengers apparently realized something was wrong on the jumbo jet and turned around, he said.

Austrian said he did not know whether the body of the one American confirmed dead in the hijacking would be on the Air Force plane. He was identified as Rajesh Kumar of Huntington Beach, Calif.

Pan Am Saturday sent a plane to Frankfurt to pick up passengers and wished to continue their flight from Karachi to Frankfurt, then London and New York. The plane, with 250 people, is expected to arrive in Frankfurt at 7 p.m. today, Austin said.



Rajesh Kumar
Huntington Beach, Calif.

HIJACKING

From Page 1

and two survived.

More than 150 people were wounded, at least 50 of them critically, hospital sources said.

Pakistani officials had reported Friday night that two hijackers were killed and two had been arrested.

In Harare, Zimbabwe, Indian Prime Minister Rajiv Gandhi said Saturday that Pakistani security forces "bungled very badly."

Speaking at a news conference at the non-aligned nations summit in Harare,

to convince the hijackers that the 747 had to be refueled.

"They hanged very badly and caused the death of a number of people," Gandhi said. "The security forces were not of a competent nature."

There were 67 Americans on the plane — Pan Am Flight 73 — when it was hijacked in Karachi en route from Bombay, India, to New York via Frankfurt, a Pan Am spokesman in New York said.

When the shooting began Friday night, security forces approached the jet-liner "in dribs and drabs," Mirza said. "Eventually a ladder was brought in for the commandos to get on the plane, 20 to 25 minutes after the shooting started."

The account Mirza gave Saturday contrasted sharply with the series of events

reporters that commandos had stormed the plane moments after the hijackers opened fire on the passengers.

Mirza said Saturday the first commando to reach the plane climbed up an emergency chute as passengers were sliding down, entered the plane and started shooting, managing to open another emergency exit in the process.

Saying that one hijacker was killed, the aviation chief said he did not know how, and he gave no further details of the operation.

Mirza told reporters there was no planned assault on the aircraft. "Our aim was right from the word go... to negotiate."

Three hijackers disguised as security guards and another wearing civilian

Ashiq Patel said.

Kumar, a real-estate investor, was ending a three-week vacation and traveling for the first time on a U.S. passport, Patel said. Kumar's wife was in "a state of shock" and was staying inside the couple's two-story suburban home, a cousin said.

Kumar was on the plane, awaiting take-off from Karachi, when four hijackers stormed the plane.

To press their demand to be flown to Cyprus, the hijackers singled out Kumar, brought him to the front of the plane, shot him dead and threw his body on the tarmac, Pakistani authorities said.

...hijacking... actions of the Pan American World Airways crew that escaped a hijacked Boeing as passengers were being held hostage.

"The crew should do anything that they have to do to stop a hijacking, and you can't fly an airplane without pilots," said Irwin Astor, spokesman for the national Air Line Pilots Association. "It's like taking a key out of the ignition."

Pan Am Vice Chairman Martin R. Shugrue has said the crew was following long-established industry procedures.

Astor and Cynthia de Figueiredo, a representative of the Independent Federation of Flight Attendants, maintained that during a hostage crisis, fewer casualties are possible if a plane is grounded. Had the shootout occurred in the air, they said, chances are the plane would have gone down, killing everyone.

— Donna St. George

Survivors Tell of Bloody Escape

—Continued from Page 2

ings, it would have been hard to find a worse flight to take.

"They told us to put our hands up in the air, and for an hour we were sitting in the seat with our hands up and looking down," the woman told the paper. "Then they told us to put our hands behind our heads and look down. (We) put our heads down as far as we could, and we sat like that for four more hours."

All of the passengers cooperated. No one played hero.

"We were practically numb," she told the paper. "We were just doing what we were told. It was out of our hands anyway."

After four hours of crouching, passengers were herded — section by section — to the restrooms. Some were given drinks of water. Before word came that no country would accept the flight, the terrorists "were friendly for awhile," Nemuvant said.

The hijackers were helping women and children get the things they needed, but once Cyprus and Iran refused to allow the plane to land, the terrorists became "erratic in their behavior — very nervous."

It stretched on for 16 hours.

"We were sitting in our seats without moving, and looking down," she told the paper. "We were awoken from sitting in one place. Our bodies were numb."

Then the lights went out. The passengers were herded to the center of the plane. "I knew then something drastic would happen," she said.

And the shooting began.

While crouched on the floor, two people were shot right in front of them. Automatic rifles cracked, grenade concussion echoes. Screaming passengers started heading for the exits, she said. She didn't.

"That's when I realized he was dead," she said. "I had to step on him to get out."

Once off the plane, she told the paper, "we weren't thinking straight at that time. We just wanted to get to light. We just started running toward the terminal."

They stopped to help drag an injured woman away from the plane, but once they got to the terminal, it was more chaos — some terrorists had escaped by mingling with the passengers.

They ducked and lay low for another 15 or 20 minutes before an all-clear was sounded.

Pakistani intelligence officials said the terrorists arrived here from Bahrain last month, and identified one as Gomer Hussain, traveling on a passport from Bahrain.

A Saudi airline official who acted as an Arabic interpreter during the siege told reporters he believed from the hijackers' accents that they were Palestinians. "Two of them are Palestinians, positively. One of them is doubtful," he said.

At least two groups claimed responsibility for the hijacking. In Nicosia, the Libyan Revolutionary Cells said it was responsible, as did the Jundallah (Soldiers of God) Organization in Beirut.

The Muslim, a leading English-language daily newspaper, reported that security agencies had been tipped by unspecified Western sources that members of the Palestinian faction headed by Abu Nidal were sighted in Pakistan. The report said security was increased at Western embassies. Government officials and diplomats refused to comment.

A Lebanese journalist in Beirut said the note from the Jundallah group appeared to have been written on the same typewriter used previously by Abu Nidal's group. The group has been blamed for numerous terrorist acts, including the attacks at the Rome and Vienna airports last December.

Pakistani officials have said the hijackers were Palestinians seeking freedom for two compatriots convicted of killing three Israelis on a yacht in Larnaca, Cyprus, last September.

Libya denied any connection with the hijacking, and the Palestine Liberation Organization denounced it.

In the wake of the massacre:

• A U.S. Air Force C-141 medical evacuation plane took on 16 of the wounded passengers to be flown to an American military hospital in Wiesbaden, West Germany.

• Pan Am sent a plane to pick up survivors who wished to continue their flight to Frankfurt, then New York. A Pan Am spokesman said the flight would leave Karachi today.

• The U.S. Justice Department said arrest warrants had been issued for the three surviving hijackers — this was before the Pakistani revision — on charges of aircraft sabotage, hostage-taking, murder and attempted air piracy. However, a department spokesman said Washington expected the hijackers to be tried in Pakistan.

Newspaper Assistant Foreign Editor Stephen K. Huddy reported that the...

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THE STARS AND STRIPES

Thursday, September 11, 1986

Military hospitals discharge 4 more victims of hijacking

By CONNIE DICKEY
Staff writer

Four more people wounded during the hijacking of a Pan American World Airways jumbo jet in Karachi, Pakistan, have been released from military hospitals in Germany.

Nagatholy Scaria, an Indian living in Cologne, Germany, and Hardial S. Matharu, from Coventry, England, were released from the Army Regional Medical Center in Frankfurt about noon Wednesday, said hospital spokesman Bill Swisher.

Scaria was hospitalized with shrapnel wounds in the back, and Matharu suffered shrapnel wounds in the back and

right heel.

An Italian, who did not want his name or travel plans released, was discharged from the Frankfurt facility on Tuesday, Swisher said.

A man, who asked not to be identified, was released from the Air Force Regional Medical Center in Wiesbaden Wednesday morning. A spokesman there said the victim suffered from shrapnel wounds in the leg and left the hospital on crutches.

Five injured passengers remain in military hospitals. Two children, a boy and girl, are being treated at the University Clinic in Frankfurt. Their conditions and names were not available.

Three of the injured remain in Wies-

baden and are in good condition, a hospital spokesman said. Those still hospitalized are Nadya A. Hussain, from suburban New York City, with gunshot wounds to the face and arm, Mallikarjun Netrakanti, from Silver Spring, Md., with a jaw fracture, and another victim, suffering shrapnel wounds and cuts, who did not have his name released.

Two victims remain in the Army Regional Medical Center in Landstuhl, Germany. Officials there said a woman suffering from heel injuries is in good condition, and her 15-year-old son, suffering from gunshot wounds in the head, is "improving steadily and is in good condition."

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